GERMAN AND ITALIAN AIRCRAFT CARRIERS OF WORLD WAR II

DOUGLAS C. DILDY
& RYAN K. NOPPEN

ILLUSTRATED BY PAUL WRIGHT

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GERMAN AND ITALIAN AIRCRAFT CARRIERS OF WORLD WAR II

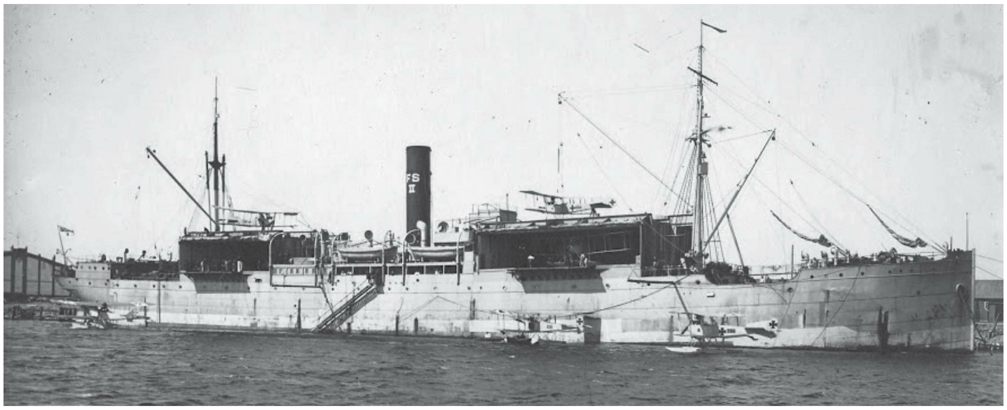
GERMANY

Introduction

Although the field of aviation was still in its infancy, by the beginning of World War I the leadership of the German *Kaiserliche Marine* (Imperial Navy) possessed a forward-thinking vision of the strategic use of naval aviation. Long-range reconnaissance and naval mine detection, coupled with the new technology of radio communication, were two strategic tasks which German naval planners quickly realized could be accomplished from the air, giving the Kaiserliche Marine an unprecedented over-the-horizon capability. The primary technological medium initially selected for these tasks was the rigid airship, or dirigible, and the Kaiserliche Marine invested significantly in its development; more than 80 dirigibles were constructed by the Luftschiffbau Zeppelin and Luftschiffbau Schütte-Lanz companies for the Kaiserliche Marine from 1912 to 1918. The preference for the dirigible over heavier-than-air aircraft throughout the first half of the war was technologically myopic in hindsight, but the long-range and combat capabilities of naval aircraft were minimal at best for much of the war. The short range of early float and sea planes, their limited armament and payload, and their inability to operate in inclement weather were some of the reasons the Kaiserliche Marine did not heavily invest in seaplane carriers and tenders. Another reason was that its handful of seaplane tenders, as well as those of the British Royal Navy and the *French Marine Nationale*, were converted from merchant vessels which did not possess the speeds sufficient to operate with battle fleets. Lastly, the *Marinenachrichtendienst* (Naval Intelligence Service) followed the troubled development and operations of HMS *Campania*, the Royal Navy's first ship with a practical flight deck; its relatively unsuccessful service from 1915 to 1917 convinced German admirals that such projects did not warrant further research and development.

German seaplane carriers, 1914–18

Entering World War I, *Großadmiral* (Grand Admiral) Alfred von Tirpitz, head of the *Reichsmarineamt* (Imperial Naval Office), and the "big gun" battleship admirals of the Kaiserliche Marine's *Hochseeflotte* (High Seas Fleet) were counting on Ferdinand Graf (Count) von Zeppelin's dirigible airships for long-range maritime surveillance, fleet reconnaissance, and bombing operations. While potentially effective in these roles, the huge slow airships were unable to provide timely tactical reconnaissance for smaller forces operating primarily in the Baltic Sea.

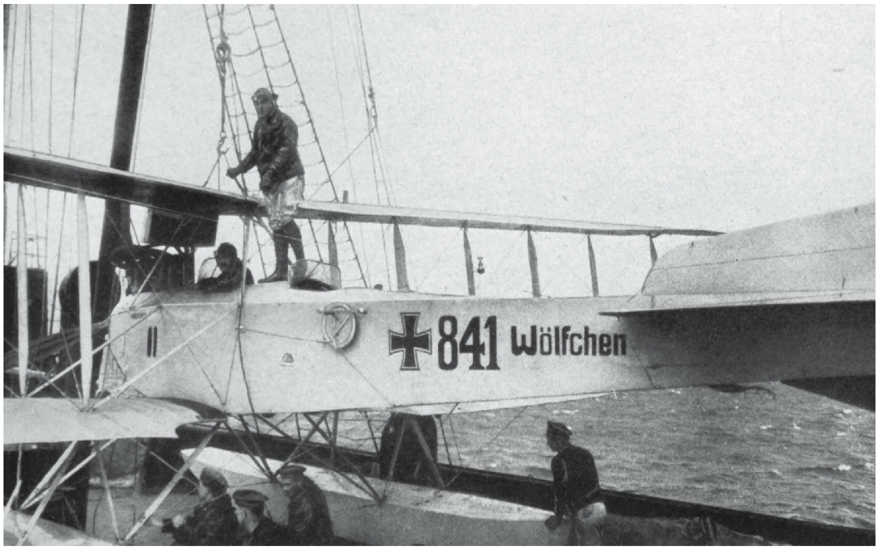


The Kaiserliche Marine seaplane carrier SMS *Santa Elena*, assigned to Germany's Baltic Fleet and capable of operating four float biplanes (two from each side), seen here with the starboard hangars open and six Friedrichshafen FF.33 two-seat reconnaissance floatplanes visible. (Ryan Noppen Collection)

Consequently, towards the end of 1914, the Kaiserliche Marine authorized the modification of the captured British merchantman *Glyndwr* to embark and employ up to four floatplanes (two carried aft on the aft well deck, with two more stored in the holds) by lowering them into the water for take-off. The modifications were completed, and the 6,000-ton ship was commissioned into the Kaiser's navy as an "auxiliary seaplane carrier" in December 1914. However, it was severely damaged by mines six months later while returning from a seaplane raid on a Russian factory on the coast of the Gulf of Riga and was never fully repaired or returned to service as an active seaplane carrier.

Nevertheless, the *Glyndwr's* operations were encouraging enough for three more merchantmen to be made into auxiliary seaplane carriers. The first two were the 13,900-ton *Answald* and the 13,200-ton *Santa Elena*, both commissioned in July 1915, after conversion by Danzig Kaiserliche Werft. Modifications included being fitted with hangars and hoisting booms fore and aft of the central superstructure with two 3.4cm/45cal antiaircraft (AA) guns mounted on the fo'c'sle and stern. Each ship operated four reconnaissance floatplanes – looking for Russian naval vessels – for the Baltic Fleet.

These operations were successful enough to warrant augmenting the pair with a third seaplane carrier, and the interned British-built 7,640-ton merchantman *Oswestry,* which had already been taken over by the Imperial Navy as a depot ship, was modified at Danzig during the first half of 1918 and commissioned as SMS *Oswald* that July. Its conversion was similar to the *Answald,* resulting in its carrying four floatplanes and mounting two antiaircraft guns.



The *Wölfchen* (Wolf Cub), the Friedrichshafen FF.33 reconnaissance floatplane, operated from the commerce raider *Wolf*. Operating in the vast Pacific and Indian Oceans, the *Wölfchen* proved invaluable in locating potential prey for the raider, resulting in a highly successful cruise. (Ryan Noppen Collection)

The most successful shipboard seaplane operation was by the Kaiserliche Marine's *Hilfskreuzer* (auxiliary cruiser) and commerce raider SMS *Wolf*. Well-disguised, the 11,200-ton armed merchantman departed Kiel in November 1916 for a 15-month, 64,000-mile (103,000km) cruise during which it operated primarily in the Indian and Pacific Oceans, laying 465 mines near Gibraltar, Cape Town, Ceylon, Bombay, Australia, and New Zealand. Using a Friedrichshafen FF.33e two-seat seaplane, nicknamed "*Wölfchen*" (Wolf Cub), to scour the vast ocean, it located, seized, and sank 14 Allied ships, totaling 38,391GRT, using its six 15cm (5.9in) guns and four torpedo tubes. Its mines sank another 13 ships, grossing a further 75,888GRT.

The *Wolf* was, by far, the most successful German commerce raider of World War I, returning home with 467 prisoners and substantial quantities of rubber, copper, zinc, brass, silk, copra, cocoa, and other essential materials taken from its prizes. The *Wölfchen* and its two intrepid airmen, Leutnant zur

See Matthaus Stein, and Oberflugmeister Paul Fabeck, contributed to this success, making 30 operational flights, scouting for British warships, ensuring potential anchorages were secure, and locating five of the prizes seized. Following the cruise, the *Wolf* – like the three seaplane carriers – operated in the Baltic Sea.

Meanwhile, over the North Sea at the end of May 1916, Zeppelin’s dirigibles failed to locate the Royal Navy’s Home Fleet, resulting in the German High Seas Fleet blundering into the Battle of Jutland. This highlighted the need for timely and effective over-the-horizon aerial scouting for naval forces. The Baltic-based converted merchantmen “auxiliary seaplane carriers” could not keep pace with the much faster heavy battle units so an elderly scouting cruiser – the Jutland-veteran 4,000-ton SMS *Stuttgart* – was modified into a “cruiser seaplane carrier” embarking two floatplanes in a hangar mounted abaft the funnels with a third carried atop the “hangar box.” It was completed in May 1918; by this time the High Seas Fleet was sequestered in port waiting for the end of the war and the *Stuttgart* saw no further action.

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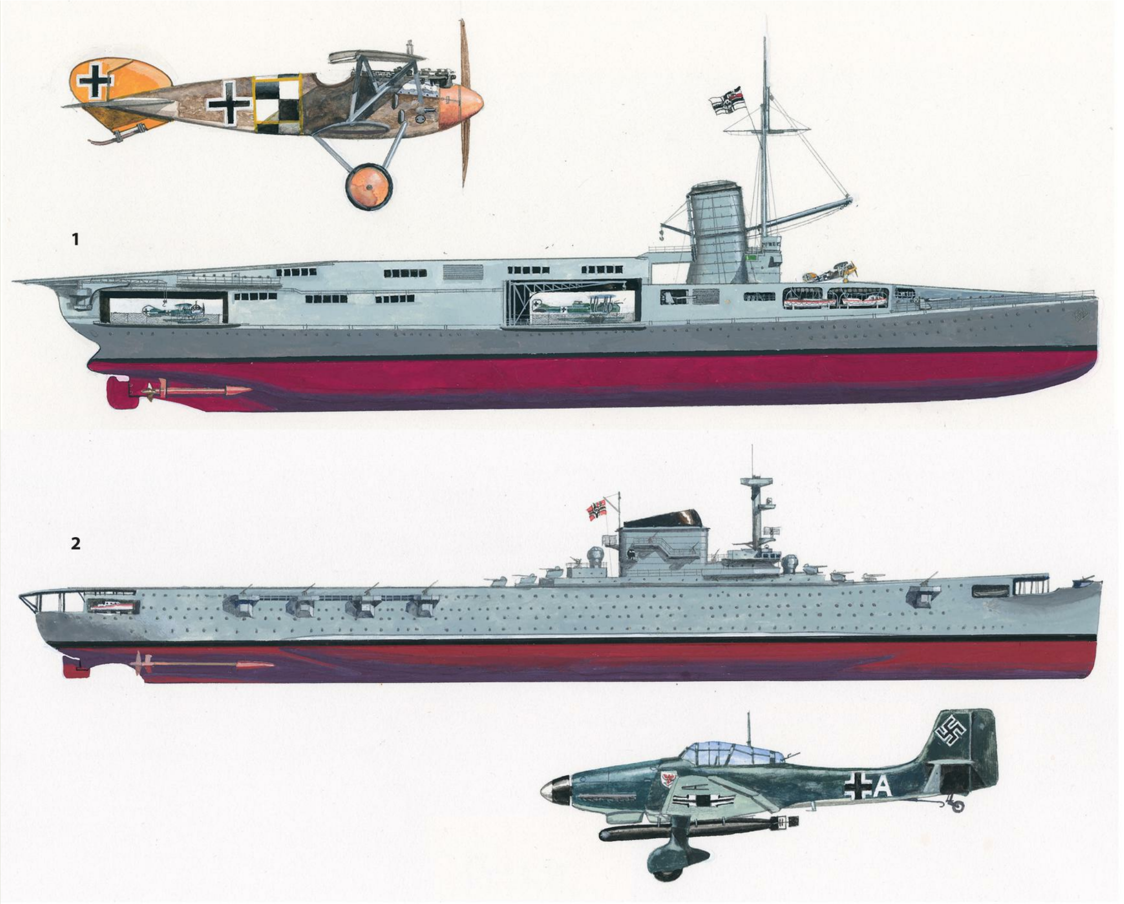


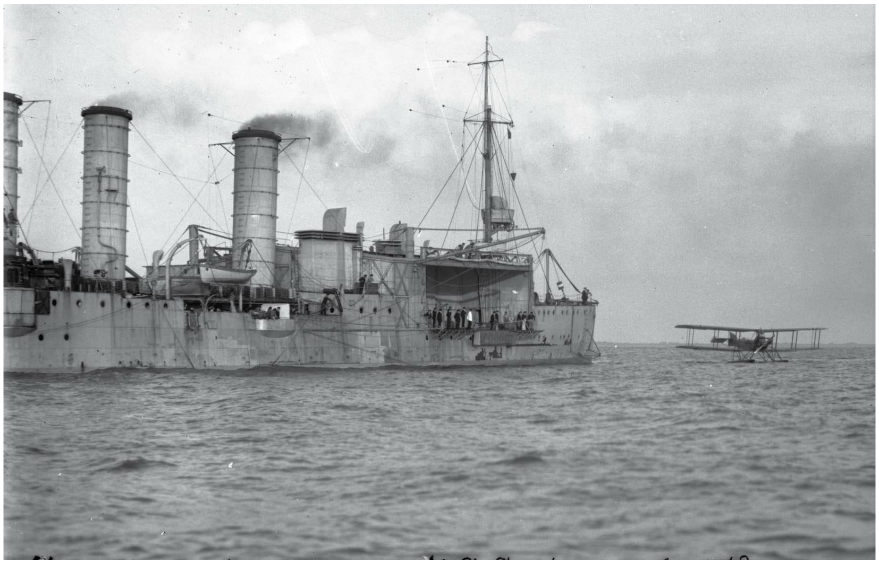
1. Designed Aircraft Carrier SMS *Ausonia*

SMS *Ausonia* was originally laid down as a 12,585-ton, turbine-powered ocean liner in the Blohm & Voss shipyards in Hamburg in 1914 for the Italian *Società Italiana di Servizi Marittimi*. According to its 1918 conversion plans, *Ausonia* was to have been equipped with a 30m take-off deck fore, connected to an upper hangar deck running amidships aft; land-based fighters would have taken off directly from the hangar deck. Above the upper hangar deck was a 128.5m landing deck, intended for the ship's complement of land-based aircraft. Beneath the take-off deck and upper hangar was a lower hangar deck where floatplanes would have been stored. Floatplanes were to have been lowered by cranes, via side doors along the lower hangar deck, onto the sea and likewise retrieved. In this manner, *Ausonia* was designed to function as both a proper aircraft carrier and a seaplane carrier. A particularly innovative feature of *Ausonia*'s conversion design was a small island, located on the starboard side, to house the bridge and a flight operations center. *Ausonia* is shown here as planned as well as an Albatros D.V fighter in the colors of Marine Feld Jasta I.

2. *Europa* Aircraft Carrier Conversion Project

When the Kriegsmarine reactivated its aircraft carrier program in the spring of 1942, designers first looked towards ocean liners as potential candidates for conversion; by this time both the Italian *Regia Marina* and the Imperial Japanese Navy had begun converting ocean liners into aircraft carriers, with the Italian *Aquila* and Japanese *Hiyo* and *Junyo* being designated as fleet carriers. Norddeutscher Lloyd's largest and fastest liner, *Europa,* initially seemed like a natural choice for conversion, particularly given the vessel's size and speed. Unfortunately for the Kriegsmarine, *Europa* would have required substantial and lengthy structural modifications, reducing its maximum speed to what would have been unsuitable for operations alongside the Kriegsmarine's remaining capital ships. As a result, consideration towards converting *Europa* was dropped relatively quickly. *Europa* is shown here based upon its preliminary conversion design as well as the Junkers Ju 87E.

All five of the Kaiserliche Marine’s seaplane carriers were surrendered to the Allies as war reparations, the *Wolf* going to France, the *Santa Elena* to the USA, and the other three to Great Britain. While the German navy would have to start from scratch building aircraft and seaplane carriers for the next war, these ships provided invaluable experience for ships and flight crews in handling aircraft from vessels at sea.



While the Kaiserliche Marine’s small seaplane carriers were adequate for operations in the Baltic Sea, the High Seas Fleet needed much faster vessels that could provide over-the-horizon aerial reconnaissance while keeping pace with the main battle group of powerful high-speed battleships. Shown here is SMS *Stuttgart*. (Bundesarchiv, Bild 134-B3828 / Fotograf(in): o.Ang.)

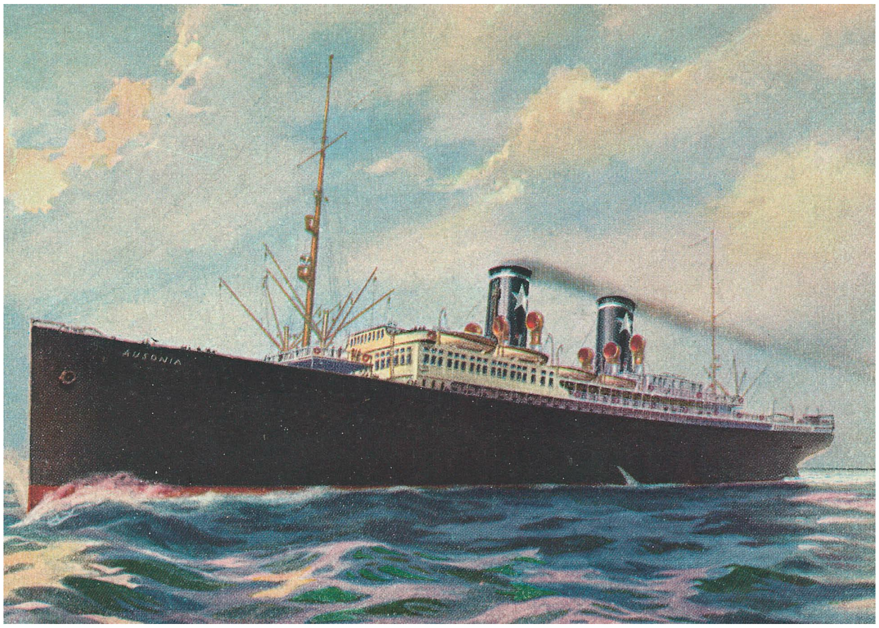
German aircraft carrier project SMS *Ausonia*, 1918

By the end of 1917, the capabilities of aircraft had increased dramatically since the summer of 1914 and the vulnerabilities of hydrogen-filled dirigibles were becoming all too apparent. Several land-based aircraft and floatplane types now possessed the capability to serve in a long-range reconnaissance role as well as having a payload that permitted the carrying of aerial torpedoes. Due to this and the need for further aerial reconnaissance and mine searching for the High Seas Fleet during offensive operations, in early 1918 the *Reichsmarineamt* (the German Imperial Naval Office) pushed for the development of *Flugzeugmutterschiffe* (aircraft mother ships) which had the speed necessary to keep up with fleet units but also could carry a sizeable aircraft complement. Two older ocean liners from the Norddeutscher Lloyd, *Bremen* and *Königin Luise*, were considered for conversion to large seaplane carriers as they were large enough to carry and operate ten aircraft, but their maximum speed of 15kt could not be appreciably increased. In October 1918, the Reichsmarineamt decided that the hull of the Italian ocean liner SS *Ausonia*, sitting unfinished in the Blohm & Voss yards in Hamburg since being launched in 1915, was a suitable candidate for conversion into an aircraft carrier with a proper flight deck, largely due to its projected speed of 21kt.

***Ausonia* specifications**	
Dimensions	length: 158m; beam: 18.8m; draft: 7.4m
Full displacement	12,585 tons
Machinery	two Blohm & Voss geared turbines producing 18,000shp and driving two screws at a maximum speed of 21kt
Aircraft	ten land-based fighters and up to 19 floatplanes

Albatros D.V specifications	
Dimensions	length: 7.3m wingspan: 9m
Powerplant	200hp Mercedes D.IIIaü inline engine
Maximum speed	186km/h
Range	350 km
Ceiling	5,700m
Armament	two 7.92 mm Spandau MG 08 machine guns

This proposal came from the dissertation of a junior officer, submitted to the Technische Hochschule Berlin in the autumn of 1918, and possessed design elements used on the Royal Navy's first aircraft carriers, HMS *Argus* and *Furious.* But the war abruptly ended in November 1918 before any realistic consideration could be given to the *Ausonia* project. Consequently, the concept of an aircraft carrier went dormant in Germany for the next 17 years.



Ordered in 1914, the SS *Ausonia* was to be a fast 12,500-ton turbine-powered passenger steamer being built for the Italian *Società Italiana di Servizi Marittimi.* by Blohm & Voss shipyards. The design envisaged its conversion into an aircraft carrier capable of embarking either 13 fixed-wing or 19 folding-wing reconnaissance floatplanes, plus about ten wheeled fighter aircraft. The project was stillborn and the *Ausonia* was canceled in 1920, being sold to shipbreakers two years later. (Ryan Noppen Collection)

Flush-deck aircraft carriers and Plan Z

Two years after Adolf Hitler seized power (*Machtergreifung*) in Germany he enabled the rapid expansion of the newly established *Kriegsmarine* (War Navy) by signing the Anglo-German Naval Agreement with Great Britain in June 1935, obtaining Britain's permission to ignore the restrictive naval provisions of the Versailles Treaty and embark upon a massive construction program constrained only by the agreed limit of 35 percent of the Royal Navy's tonnage in all warship classes.

Heading the *Oberkommando der Marine* (High Command of the Navy or OKM), Admiral Erich Raeder cataloged the planned expansion of his navy in that year's *Schiffbauersatzplan* (Ship Building Plan) Phase II (1936–43), requesting the Reichstag approve the construction of two heavily armored 35,000-ton battleships mounting 15in guns (this pair became the dreaded *Bismarck* and *Tirpitz*), two 23,000-ton aircraft carriers (*Flugzeugträger A* and *B*), and three 10,000-ton heavy cruisers. These were to augment the two 26,000-ton, 11in gun battlecruisers *Gneisenau* and *Scharnhorst* and two heavy cruisers being completed under Phase I (1932–35).

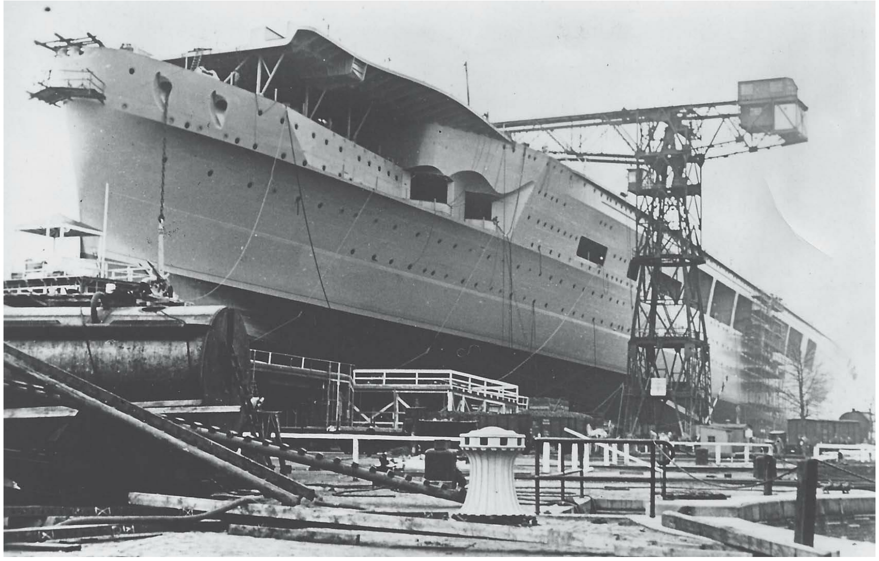
When it became obvious that Hitler was intent on starting a second European war, Raeder realized that he and his OKM staff had to devise a naval strategy to effectively counter Britain's Royal Navy and develop an aggressive shipbuilding program to implement it. Begun as "Plan X," the strategy was to dispatch several surface raiders such as the service's fast, light, heavily armed *Panzerschiffe* ("armored ships," sensationalized as "pocket battleships" by the British press) to tie up Royal Navy heavy units around the globe so that the Kriegsmarine's inferior numbers of capital ships could operate successfully in the North Sea. The "breakout" into the North Atlantic by the armored cruisers, as well as newly designed light cruisers, would be assisted by two task forces, each consisting of a pair of battleships and an aircraft carrier.

The final iteration of the OKM's proposed shipbuilding program – "Plan Z" – called for the construction, by 1947, of six 56,000-ton 16in gun H-class battleships, three 29,000-ton 15in gun O-class battlecruisers, seven commerce raiding M-class light cruisers to augment the service's three *Panzerschiffe*, and two additional small 12,000-ton aircraft carriers (*Flugzeugträger C* and *D*) to provide increased air cover. Raeder's Plan Z was approved by Hitler in March 1939.

Six months later Hitler started World War II, forcing Raeder and his Kriegsmarine to fight with what they had.

Graf Zeppelin-class aircraft carriers

Flugzeugträger A (Airplane Carrier A), Germany's first real aircraft carrier, was originally designed by the Kriegsmarine's *Kriegsschiffbauamt* (Warship Construction Bureau or K-Amt) under the direction of the naval chief architect, engineer Wilhelm Hadeler, in the winter of 1933–34. Designed from the keel up as a 20,000-ton through-deck fleet carrier, it was intended to embark 50–60 aircraft, make 33kt and – in a concession to the "big gun" naval leaders – mount eight 8in guns and have the armor and interior protection of a light cruiser.

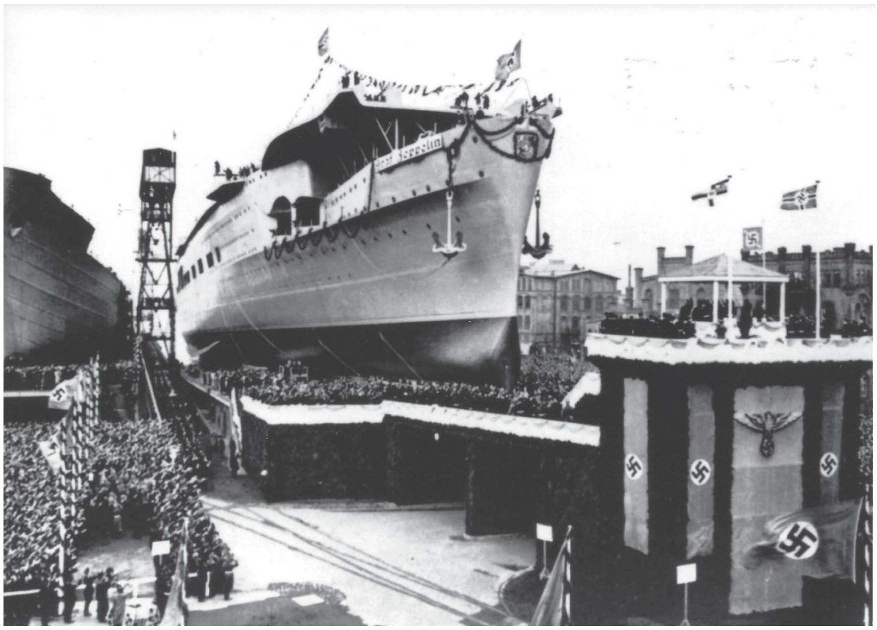


Construction of the German aircraft carrier *Graf Zeppelin* began on December 28, 1936, signaling the Kriegsmarine's intent of providing its battle fleet with an aerial strike and air defense capability. It was up to the Luftwaffe to develop the aircraft, train the crews, and form the units of a *Trägergruppe* (carrier [air] group). (Douglas Dildy Collection)

The designers had made a thorough study of the HMS *Courageous* – at that time considered the state of the art in carrier development – and toured HMS *Furious* during "Navy Week" at Portsmouth in 1935. Additionally, a three-man K-Amt team visited the Imperial Japanese Navy carrier *Akagi* – a vessel very similar to the two Royal Navy carriers in origin and configuration – that autumn. The Japanese provided about 100 plans and diagrams, including blueprints, regarding the flight system – catapults, arresting gear, and elevators – and motivated Hadeler's team to add the third elevator amidships. Overall, these visits provided little new or additional information but they at least confirmed the direction upon which Hadeler and his staff of naval architects were embarking.

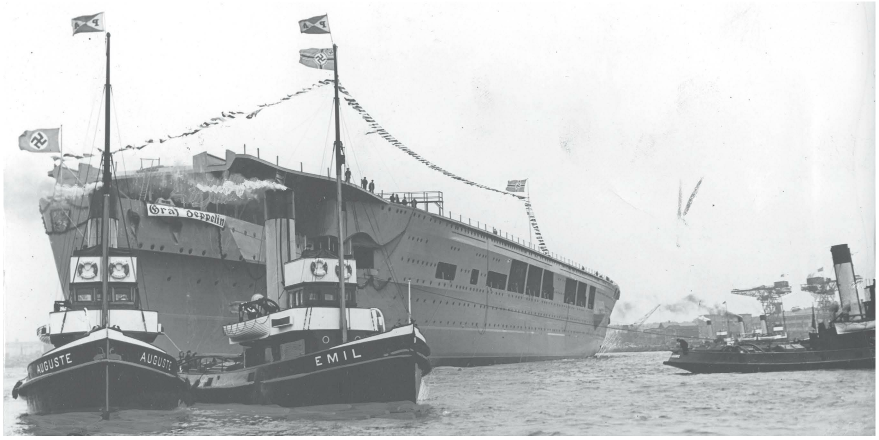
The ship's design embodied traditional German naval concepts: high freeboard to enhance seakeeping in the rough Atlantic and North Sea conditions, a powerful propulsion plant to maximize speed, and a strong defensive armament to fend off surface and aerial attackers. While superior speed would enable the carrier to outrun any British capital ship, the hull-mounted 20.3cm (8in) SK C/34 guns would effectively counter Royal Navy cruisers. The ship's vitals were to be protected by a 4in belt amidships, tapering to 3in forward and aft, with deck armor, one deck below the hangars, of 1.5in and 0.75in for the flight deck. The anticipated air threat was medium/high-altitude level bombers, so a battery of five twin 10.5cm (4.1in)

SK C/33 turrets – two forward and three aft of the long, low island and the large funnel – were included, supplemented by 29 smaller-caliber automatic weapons for close-in defense. Hadeler calculated the ship would actually displace 24,500 tons and be capable of 35kt top speed.



KMS *Graf Zeppelin* was launched on December 8, 1938, amid huge fanfare and some 15,000 spectators, including Hitler, Göring, and Raeder. That same day the Luftwaffe announced the formation of the ship's *Trägergruppe* 186, although at that time it consisted of only one Bf 109E and one Ju 87B squadron. (US Navy Photo NH78305)

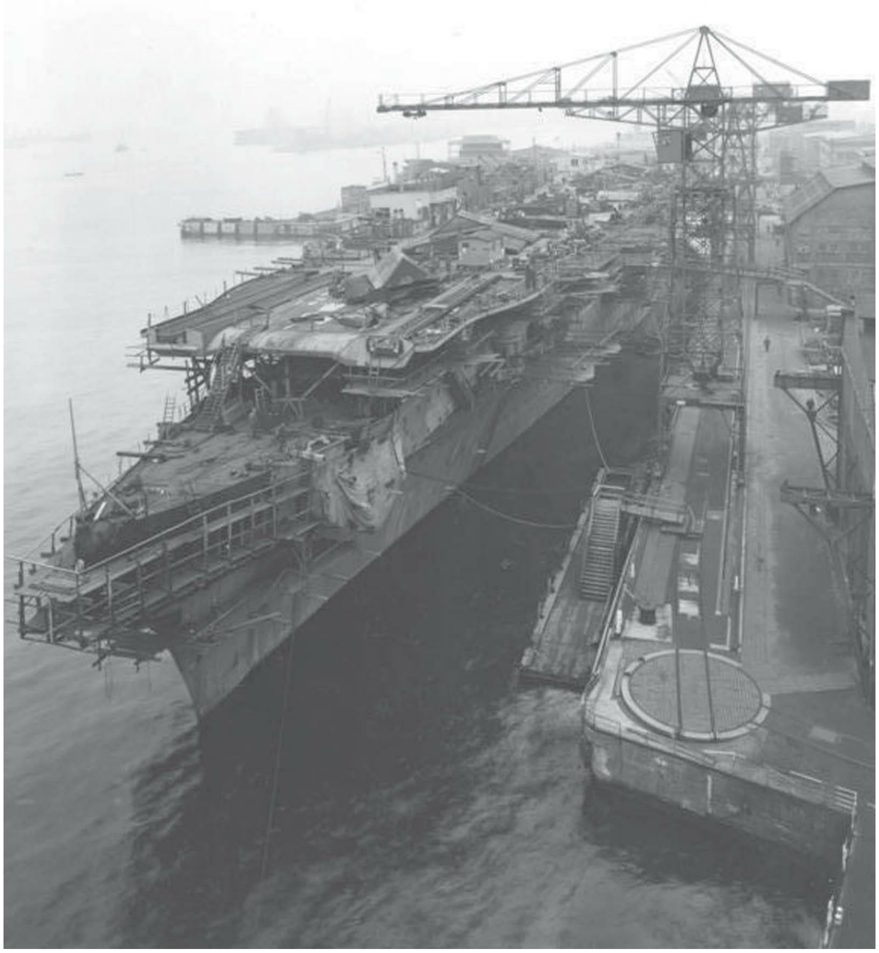
By 1936, the design was well enough developed to be included in 'Plan Z' and the Reich's budget that year and a second carrier of the same design – *Flugzeugträger B* – was included in the 1938 budget. On November 16, 1936, Deutsche Werke Kiel AG shipyard was awarded the contract to build the ship and on December 28, less than three weeks after the brand-new 11in battlecruiser *Gneisenau* was launched from Slipway 1, the keel of hull "K-252" was laid in its place. Almost exactly two years later – on December 8, 1938 – the shiny flat-topped hull of the Kriegsmarine's newest warship slid down the ways and into the water.



When launched the German aircraft carrier was the longest – and largest in terms of volume – ship built in Europe. It measured 844ft (257.3m) and had a flight deck 800ft (243.8m) long. After launch, the *Graf Zeppelin* was towed to the "equipping pier" where its outfitting – building the ship's superstructure and adding its weapons, catapults, arresting gear, and other machinery and equipment – was begun. (Bundesarchiv, Bild 183-H16145 / Fotograf(in): o.Ang.)

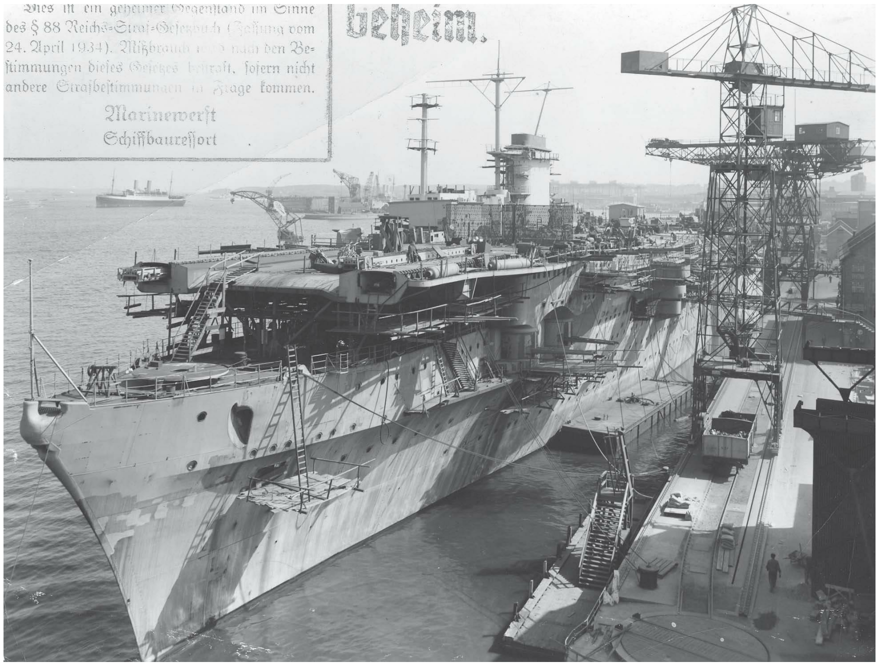
Christened the KMS *Graf Zeppelin* by Ferdinand's daughter, Hella Gräfin (Countess) von Brandenstein-Zeppelin, before Hitler, Raeder, Göring, and 15,000 spectators, after launching, the (now) 27,030-ton warship was towed to the shipyard's "equipping pier" for completion. There its builders added its island, funnel, and masts, and mounted its 17ft (5.2m) long "Atlantic prow." Comparing favorably to the Royal Navy's 27,700-ton HMS *Ark Royal*, its 800ft (243.8m) long flight deck was 97ft (29.6m) wide and sat 51ft (15.6m) above the waterline. The carrier had a beam of 88.6ft (27m), before anti-torpedo bulges were added, and a draft of 25ft (7.6m). It was powered by 16 oil-fired ultra-high-pressure boilers feeding four Brown, Boveri & Cie. (BBC) 50,000shp geared turbines, turning four four-bladed 14.4-ft (4.4m) diameter screws. The powerplant was very similar to that installed in the battlecruiser *Scharnhorst*, that vessel using three BBC steam turbines to produce 165,930shp, giving the 38,700-ton warship a maximum speed of 31.5kt. At an operational displacement of 29,720 tons, *Graf Zeppelin* was calculated to have a 34.5kt top speed, enough to keep pace with the Kriegsmarine's fastest warships regardless of type or class and could cruise 6500nmi at 19kt.

Outfitting the ship was full of fits and starts because the design evolved as construction continued, resulting in seemingly interminable delays. The day Hitler invaded Poland (September 1, 1939) and started World War II, the carrier was considered 85 per cent complete. By this time, its main antiship armament had been changed to sixteen 15cm (5.9in) L/55 SK C/28 guns paired in casemate-mounted turrets, two forward and two aft on each side, sufficient to fend off enemy destroyers.



At the "equipping pier," workers added the island, funnel, and masts topside while weapons, catapults, arresting gear, and other machinery and equipment were installed. In April 1939, the builders began adding the Kriegsmarine's distinctive "Atlantic prow," increasing the carrier's length to 861ft (262.5m). Work continued for the first eight months, but the initiation of World War II resulted in the Kriegsmarine's priorities quickly changing to producing U-boats. (Bundesarchiv, RM 25 Bild-60 / Fotograf(in): o.Ang.)

Adopting the Imperial Japanese Navy practice, the carrier's warplanes were to be fueled and armed on the hangar decks and brought up to the flight deck for launching, so the flight deck was fitted with three center-line elevators, forward, amidships, and aft. These had "clipped corners," resulting in a roughly octagonal shape, measuring 46ft (14m) wide by 42.7ft (13m) long. The *Reichsluftfahrtministerium* (Reich Air Ministry or RLM) was required to design aircraft which would, of course, fit within these dimensions.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Geheim.

By June 1940, when this photo was taken, the *Graf Zeppelin* was 90 per cent complete. All propulsion machinery had been installed, as had the hull-mounted 15cm (5.9in) guns – here the forward port weapons can be seen aimed broadside from their casemates – and the base for the bow twin 3.7cm Flak gun mounting. There was still much work to be done but the construction was more or less on schedule for commissioning in December. (Bundesarchiv, RM 25 Bild-62 / Fotograf(in): o.Ang.)

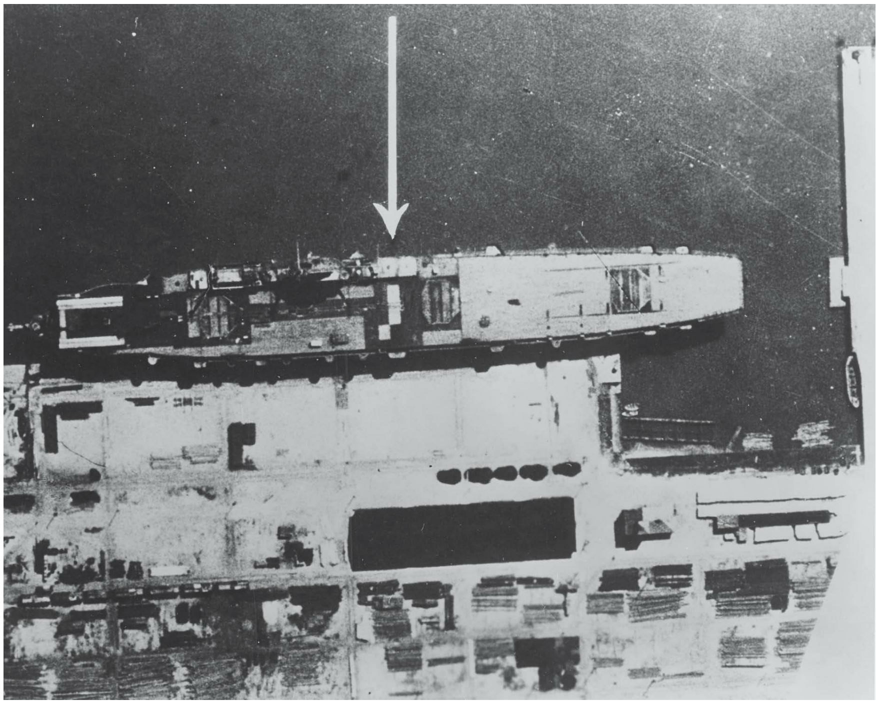
At the bow, the flight deck incorporated two compressed air catapults, each with “runs” 77ft (23.5m) long. Developed by Heinkel, the carrier’s catapult system used “launching sleds” (also called “cars”) where an aircraft taxied onto the sled’s cradle, then the catapult would sling the aircraft into the air. Operating at up to 881.75psi, the compressed air catapults were designed to launch a 5,500lb (2,268kg) fighter (the Bf 109E weighed 5,600lb/2,540kg) at 87mph (140km/h) or a 11,000lb (4,989kg) bomber (a loaded Ju 87B weighed 11,023lb/5,300kg) at 81mph (130km/h). At the end of the “run,” the sled came to an abrupt halt – literally “throwing” the airplane into the air – and was then shunted sideways onto below-deck return rails, to be raised into position for the next launch. Hadeler’s K-Amt designers estimated the ship could launch eight aircraft in three and a half minutes using this system.

Aft, four DEMAG cross-deck aircraft-arresting wires were fitted to bring landing aircraft to a halt. Set about 10in above the deck, the continuous cables were connected to electric winches located portside on A-deck, which acted as dynamos, supplying resistance that was able to stop landing aircraft within 72–105ft (23–32m) with a deceleration of 2.2 to 2.6G. Once the cable was "unhooked," the winches retracted the wire within 12–15 turns of the spool. Frictional brakes were provided as an emergency back-up to the cable winches, and a pair of hydraulically-raised barriers – one each forward and aft of the amidships elevator – was provided in case the aircraft's hook skipped over the wires.

Like *Ark Royal,* the German carrier had two hangar decks. The overall hangar "box" measured 52ft (16m) between longitudinal bulkheads – the upper hangar was 607ft (185m) long, minus space for funnel uptakes and other ship's equipment, and the lower one was 564ft (172m) long – and together the two decks could accommodate approximately 43 aircraft, depending on the combination of types to be embarked. By this point the Luftwaffe had revised its desired complement to embark a dozen fighters and about 30 reconnaissance and bombing aircraft. As the design matured, it was planned that the upper hangar would house 13 Ju 87C Stuka dive bombers forward and 12 Bf 109T fighters aft, while the smaller lower hangar was to hold 18 Fi 167 reconnaissance/torpedo biplanes.

Pier-side at Kiel, *Graf Zeppelin* was due to be completed by October 1, 1940, and was scheduled for its sea trials that winter. However, with only a year to go, work slowed once Hitler initiated hostilities because Raeder's unprepared navy was forced to turn to U-boat production in order to have any strategic relevance in the conflict.

Meanwhile construction had begun in October 1938 on *Flugzeugträger B,* its keel being laid by Friedrich Krupp Germania Shipyard in Kiel, with a planned completion date of December 1941, but work was stopped on September 19, 1939, and the project canceled. It was broken up beginning February 28, 1940, so that the materials could be used in other projects. Although repeatedly said to have been named the *Peter Strasser*, there is no documentary evidence of this and in archival records the vessel is consistently referred to as *Flugzeugträger B.*



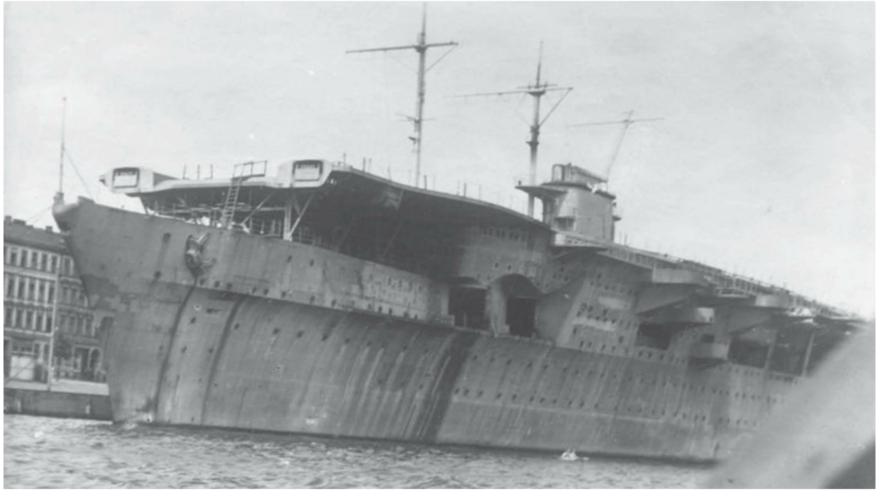
By January 1, 1941, high-flying RAF photographic reconnaissance aircraft had located *Graf Zeppelin* moored to the dock at the former Polish Oksywie naval base at Gdynia (called Gotenhafen by the Germans). Thought to be out of RAF bombers' range it became a depot ship for the Kriegsmarine's lumber supplies, its "in storage" status being considered a temporary condition. (IWM Photo MH 5813)

While its sole aircraft carrier languished incomplete at Kiel, in April 1940 the Kriegsmarine launched the invasion of Norway and Denmark, a strategic move intended to expand the navy's capability to control the North Sea. The Raeder's "Norwegian adventure" proved to be a very expensive undertaking: one heavy and two light cruisers, ten destroyers, and six U-boats were lost. Even worse, both 11in battlecruisers – KMS *Gneisenau* and *Scharnhorst* – and the armored cruiser *Lützow* were seriously damaged, requiring months to repair. Consequently, all dockyard facilities and as many shipyard workers as possible were needed to fix the Nazis' battered fleet.

With the aim of finishing *Graf Zeppelin* now eclipsed by the urgency to repair his damaged battlecruisers as well as complete the new 15in battleships *Bismarck* and *Tirpitz*, Raeder ordered work on the carrier suspended for the time being. The ship's 15cm (5.9in) SK C/28 guns were removed and sent to Norway to arm new coastal batteries and its flak guns were distributed elsewhere. The completion date had slipped to January 1941 (at the earliest) with another 12 months of sea trials and training before the warship would be combat-ready.

With its engine room equipment also not yet operational, on July 6, 1940 *Graf Zeppelin* was towed out of Kiel harbor, headed for Gdynia, Poland (called Gotenhafen by the conquering Germans), a move intended to put the carrier into storage out of range of RAF bombers. Not quite out of range, the Royal Air Force (RAF) attempted a nighttime low-altitude precision bombing attack by nine Lancasters – each carrying one 5,500lb (2,495kg) Capital Ship Bomb – on the night of August 27–28, 1942. Such a mission was beyond the RAF's capabilities and no hits were scored. Turned into a depot ship for the Kriegsmarine's lumber supplies, the *Graf Zeppelin* languished at Gdynia for almost a year.

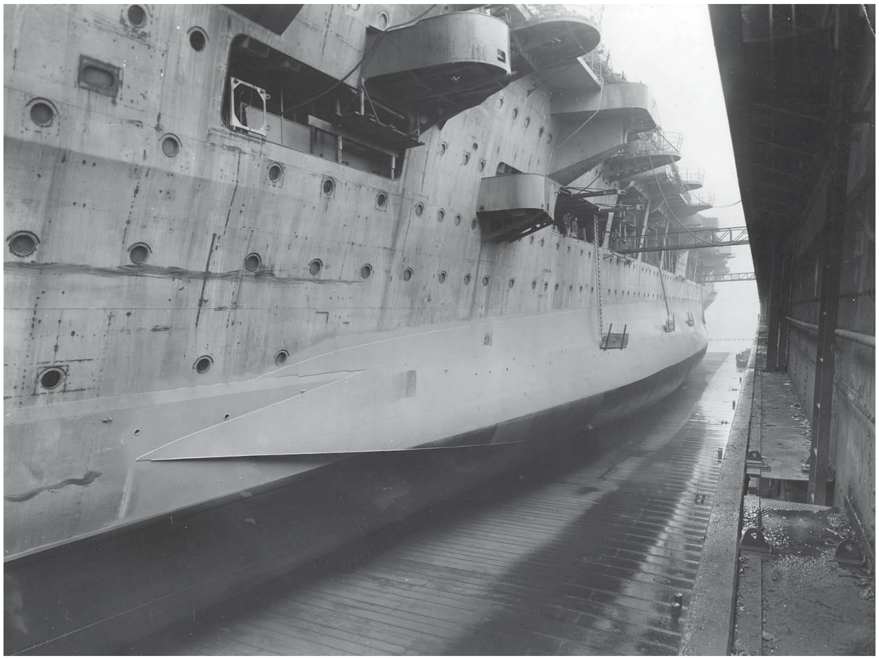
Anticipating the launching of Hitler's long-awaited invasion of the USSR on June 22, 1941, Raeder had the carrier towed once again, this time westwards to Stettin (now Poland's Szczecin) to place it out of range of Soviet bombers, mooring pier-side the day before the Panzers rolled. When Hitler's over-ambitious campaign to crush the Soviet Union in 1941 (Operation *Barbarossa*) stalled approaching Moscow, Leningrad, and Rostov-on-Don, the Eastern Front became an overriding obsession for the *Führer*.



In anticipation of Hitler's invasion of the Soviet Union, in June 1941 the *Graf Zeppelin* was moved to the Kriegsmarine's dock at Stettin (now Szczercin, Poland) naval base. The months of neglect were beginning to show their effects on the once resplendent hull of the Nazis' only aircraft carrier. (Bundesarchiv, Bild 134-B0676 / Fotograf(in): o.Ang.)

Once the USA joined the European conflict on December 11, it became patently obvious to Hitler that forays into the North Atlantic by Kriegsmarine surface combatants had become too risky to undertake. This was because the

Royal Navy's Home Fleet was now joined by the US Navy's Atlantic Fleet, which included three 14in battleships (USS *Arkansas, New York*, and *Texas*) as well as two aircraft carriers (USS *Ranger* and *Wasp*), ensuring much greater protection of the growing numbers of large convoys streaming across the North Atlantic to Britain.

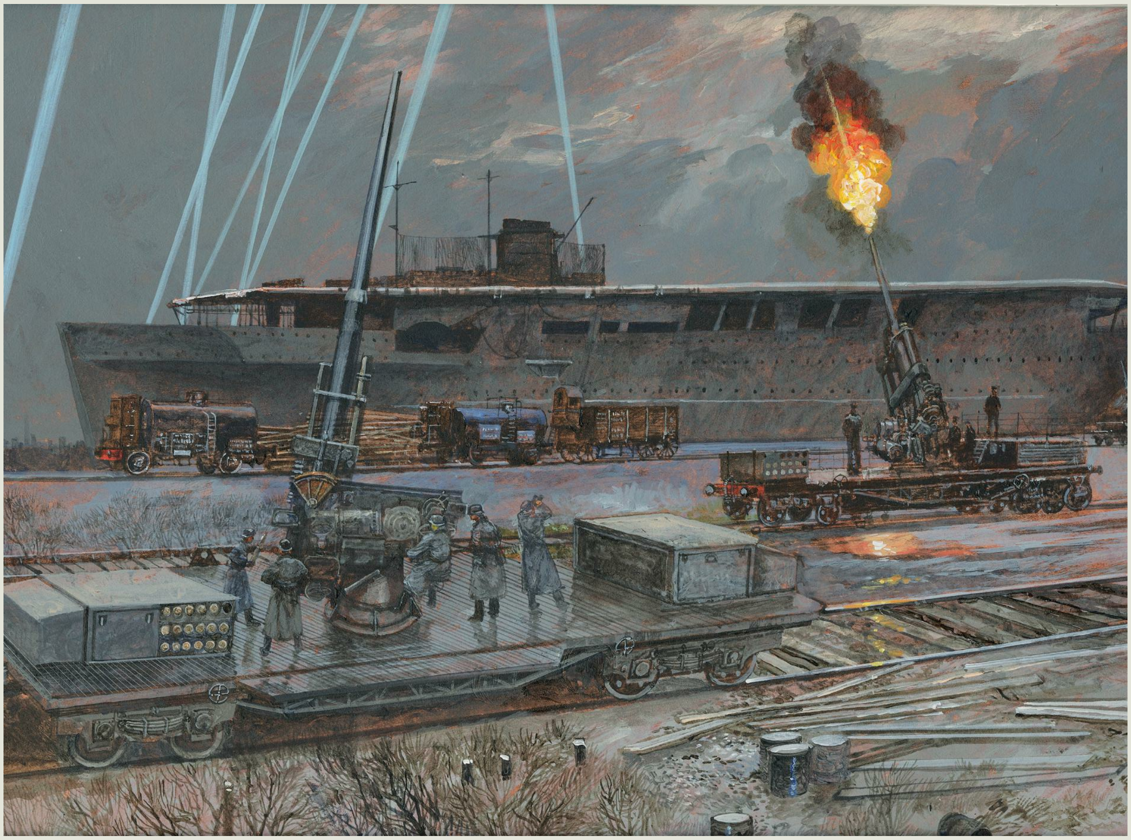


Graf Zeppelin in the 40,000-ton floating drydock at Kiel, seen after the completion of its counter-poise bulges. In addition to correcting the ship's list, these afforded additional antitorpedo/mine protection and provided extra fuel tankage, extending the carrier's range by about 1,500nmi. (Bundesarchiv, RM 25 Bild-64 / Fotograf(in): o.Ang.)

Instead, Hitler reasoned, the Kriegsmarine's battleships and cruisers could be better used interdicting the Allies' lifeline to the Soviet Union, which passed through the Norwegian Sea to Murmansk and Arkhangelsk. Raeder's remaining battleship – *Bismarck* had been lost during Operation *Rheinübung* (Rhine Exercise) in May 1941 – the KMS *Tirpitz* had been positioned near Trondheim, Norway, on January 16, 1942 and, following Operation *Cerberus* (the famous "Channel Dash" on February 11–13) was joined by heavy cruiser *Prinz Eugen* and armored cruiser *Admiral Scheer* early the next month. The mighty Nazi battleship's first operational sortie – Operation *Sportpalast* (Sports Palace), March 5–9 – was inauspicious: *Tirpitz* was unable to locate its quarry (convoys PQ-12 and QP-8) and was driven back into port by daring attacks by a dozen Fairey Albacore torpedo bombers (NAS 817 and 832) from HMS *Victorious*, which came within 30ft (9m) of achieving at least one hit.

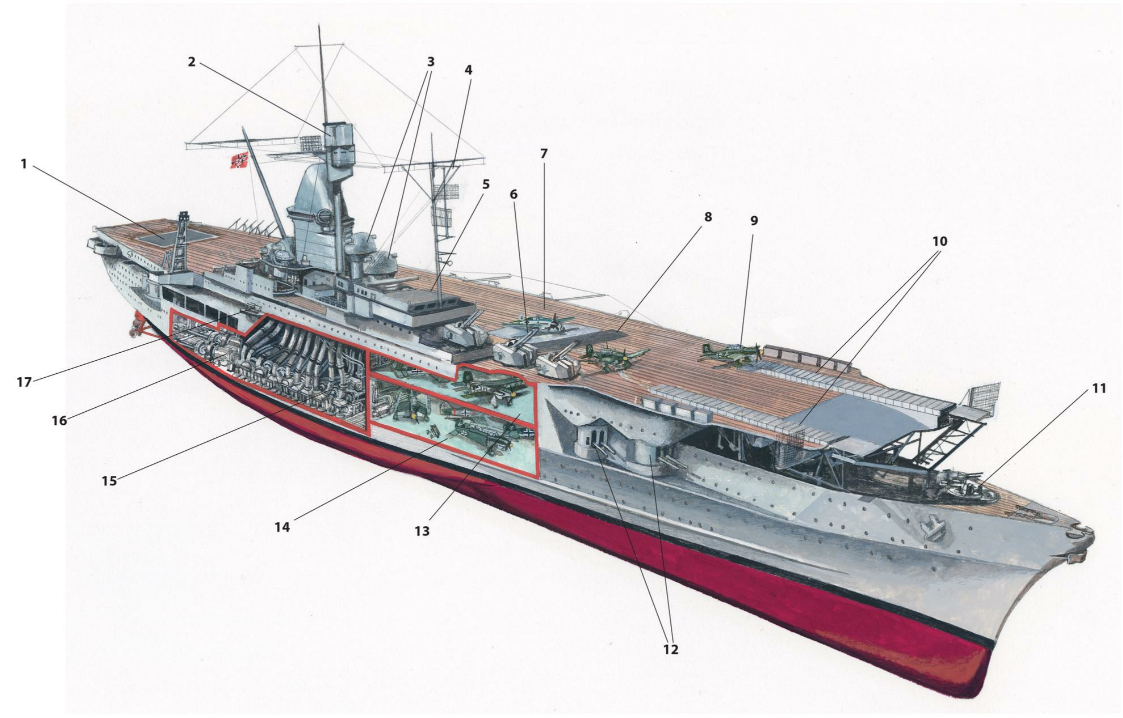
It was quite obvious to Raeder that in order for this new North/Norwegian Sea strategy to succeed, he needed carrier-based aviation to help locate the target convoys – and their covering “distant support” carrier/battleship task forces – and to provide fighter cover against enemy carrier-based aircraft. Meeting with Hitler three days after the *Tirpitz*’s narrow escape, the mounting evidence in favor of carrier aviation belatedly convinced the Führer to order completion of the *Graf Zeppelin* “in the shortest possible time in view of the vital importance of such a [fleet] unit.”

B RAF aerial bombardment of *Graf Zeppelin* on the night of August 27–28, 1942



Despite its potential at sea had it been completed, the British Royal Air Force made only one attempt to sink the German aircraft carrier *Graf Zeppelin* during World War II. In late August 1942, *Graf Zeppelin* was moored along a wharf in Becken VIII (Basin 8) of the Deutsche Werke shipyards at Gdynia, Poland, known as Gotenhafen to the Germans. Around 2000hrs on the evening of August 27, 1942, nine Lancaster bombers (three from No. 106 Squadron and six from No. 97 Squadron), led by Wing Commander Guy Gibson (later to command the Dam Busters Raid), took off from their bases in Britain and headed for Gotenhafen; their target was *Graf Zeppelin*. Each bomber carried a single 5,500lb (2,268kg) Capital Ship Bomb as well as a new Stabilized Automatic Bomb Sight. Wing Commander Gibson had intended to attack *Graf Zeppelin* from an altitude of 6,000ft (1828.8m) but when his aircraft arrived in the vicinity of Gotenhafen, they found the target area covered by dense haze. In spite of heavy antiaircraft fire, Gibson's aircraft circled the target area for an hour until each bomber had made an attack run. Gibson and his crews never saw *Graf Zeppelin* during the attack due to the cloud cover but some of his aircraft attempted attacks from altitudes between 8,000ft (2438.4m) and 10,0000ft (3,048m) nevertheless. Others made bombing runs against a secondary target, the hulk of the battleship *Gneisenau* moored along a wharf in Becken V of the yard, after spotting it through gaps in the clouds. No hits were scored on either warship and all of Gibson's aircraft returned safely to base. This scene shows *Graf Zeppelin* moored in Becken VIII on the evening of August 27–28, 1942, during Gibson's raid. German flak crews are firing from 10.5cm Flak 38/39 mobile batteries in the railway yard adjacent to Becken VIII.

C Graf Zeppelin



KEY
1. Aft elevator
2. Fighter direction tower
3. 10.5cm gun directors
4. FuMO radar antenna
5. Bridge and air operations room
6. 10.5cm SK C/33 (L50) antiaircraft turret
7. Messerschmitt Me 155
8. Forward elevator
9. Junkers Ju 87E
10. Deutsche Werke catapults
11. 3.7cm SK C/30 (L/83) dual mount
12. 15cm SK C/28 (L/55) guns in casemates
13. Upper hangar
14. Lower hangar
15. La Mont boilers
16. Brown, Boveri & Cie geared turbines
17. 2cm Flak C/38 Flakvierling mount

After being in storage for 22 months, the *Graf Zeppelin's* design was revised to modernize its primary combat features in light of ongoing carrier warfare, especially in the Pacific. The improvements included the addition of a pedestal-mounted armored fighter direction center and GEMA Seetakt air and sea search radar and a sixth twin 10.5cm flak turret while retaining the 15cm SK/28 surface warfare armament, the 16 La Mont boilers/four 50,000shp BBC steam turbines, and two hangar decks. The upper hangar was originally built to accommodate 12 Bf 109T fighters and 13 Ju 87C dive bombers while the lower one could hold 18 Fi 167 reconnaissance-torpedo bombers. The ship's reorganized CAG was to consist of one fighter (Bf 109T, to be replaced by the Me 155 in 1946) squadron and three squadrons of Ju 87E multi-role combat aircraft. Refueling and bomb/torpedo loading were to occur on the hangar decks and the aircraft would be lifted to the flight deck using three elevators and launched using a pair of Deutsche Werke catapults, shown here with their tracks covered by protective metal plates.

***Graf Zeppelin* specifications**

Dimensions	length: 262.5m; beam: 36.2m; draft: 8.5m
Full displacement	33,550 tons
Ship's complement	1,720 men
Machinery	four Brown, Boveri & Cie geared turbines, fired by 16 La Mont high-pressure boilers, producing 200,000shp and driving four screws
Aircraft	12 Messerschmitt Bf 109T or Me 155 and 28 Junkers Ju 87E
Catapults	two 881psi Deutsche Werke compressed air-driven catapults
Maximum speed	33.8kt
Range:	8,000km at 19kt
Protection	Armored belt: 100mm amidships tapering to approximately 70mm fore and aft; Deck Armor: 20mm beneath the flight deck and 40mm beneath the lower hangar deck.
Armament	16 15cm SK C/28 (L/55) surface warfare guns housed in eight twin Dopp MPL C/36 casemate mounts, four on each side (15cm SK C/28 gun had a range at 40º elevation of 23,000m and had an elevation range of -10º to 40º; 8 shells could be fired per minute) 12 10.5cm SK C/33 (L/50) antiaircraft guns mounted in twin turrets with three fore of the island and three aft (10.5cm SK C/33 gun had a range at 80º elevation of 12,500m and had an elevation range of -3º to 85º; 15–18 shells could be fired per minute) 22 3.7cm SK C/30 (L/83) antiaircraft guns in 11 twin Dopp L C/30 mounts, one on the bow and five in sponsons along each side of the flight deck (3.7cm SK C/30 gun had a range at 85º elevation of 6,800m and had an elevation range of -9º to 85º; 30 shells could be

	fired per minute) 28 2cm Flak C/38 (L/65) antiaircraft guns housed in seven Flakvierling-quadruple barrel mounts, four along the portside of the flight deck and three starboard (2cm Flak C/38 gun had a range at 85º elevation of 3,700m and had an elevation range of -12º to 90º; 220 shells could be fired per minute)

Following an extensive series of meetings within and between the naval staff, Luftwaffe, and RLM, a conference with Hitler was held at the Führer's HQ on April 16, 1942. From the discussions, Hitler agreed that the *Graf Zeppelin* should be completed after all. The fleet carrier's hull was to be finished and half of the machinery installed was to be made fully operating, at least enough to steam at 25–26kt for flight tests to be conducted. Other modifications, such as radar installation, an armored "fighter director control tower," increased antiaircraft armament and a taller funnel, were also required. Initially the embarked carrier air group (CAG) would consist of a dozen Bf 109Ts and 28 new Ju 87Es.

After the counter-poise bulges were completed, on April 21–23, 1943 the forlorn and forsaken *Graf Zeppelin* was towed back to Stettin and anchored in shallow water in a nearby estuary to await its final fate. (Douglas Dildy Collection)

The ship was to be towed to Kiel for the required modifications to be made. The main modification was that the island's staff mast was to be replaced with a tower containing the ship's command and weapons control center and fighter director station in a shrapnel-proof housing. Atop would be mounted the 8-ton GEMA Seetakt ("Sea Tactic") surface and air search radar, capable of detecting an aircraft at 500m (1,804ft) altitude at a distance of 28km (17.4 miles). A sixth dual 10.5cm L/65 G/33 Flak gun was to be mounted ahead of the island and the ship's light antiaircraft armament increased to twenty-eight 2cm L/115 C/38s in seven Vierling L/38 quadruple mounts.

The ship already had a noticeable list due to miscalculations in the original design and the additional weight on the starboard side of the ship only exacerbated the problem, requiring counter-poise bulges to be affixed to the bilge keel, with the port bulge constructed of much heavier steel (35mm vs 12mm thickness) and filled with 300 tons of concrete ballast. The bulges also served as "external fuel tanks" carrying 1,550 cubic meters of fuel oil – increasing the warship's cruising range from 6,500 to 8,000nmi – and provided enhanced anti-torpedo/mine protection.

A confirmatory meeting with Hitler on May 15, 1942 – during which he also approved the conversion of an unfinished Hipper-class heavy cruiser and three passenger liners into auxiliary aircraft carriers – scheduled the activities needed to finally complete and commission the *Graf Zeppelin*. The ship's modifications were to be completed by April 1943, so that flying tests could begin on August 1 with operational sea trials following in the winter of 1943–44. Once operational, the ship would join Raeder's battle group in Norway, being based at Trondheim with its CAG stationed at nearby Oyesand airfield between sorties.

Escorted by three Type 35 minesweepers and six patrol boats, beginning on November 30, 1942, *Graf Zeppelin* was towed from Gdynia to Kiel and five days later it was slipped into the 40,000-ton floating drydock so that the hull modifications could begin. While the external work was proceeding, engineering crews began working on the powerplant, readying the two inner turbines and shafts for self-propelled operation. Adding the armored control tower, mounting the radar, and increasing the height of the funnel were to begin shortly after the first day of the new year. The added construction raised the warship's displacement to an estimated 24,500 tons (standard) and 33,550 tons (full load).

Shortly after the great vessel's arrival *Graf Zeppelin* was toured by a group of Italian naval officers, a commission studying German technologies for possible application to their own aircraft carrier project, the *Regia Marina*'s (Italian Royal Navy) RMS *Aquila* (Eagle), which was being converted from the 48,502-ton ocean liner SS *Roma*. Reporting back to the *Supermarina* (the Regia Marina's high command), the commission wrote:

> The hull [is] completely in position, engines and boilers ready to function although all trials have not yet been carried out. The electrical plant is complete except for the cables to some small supply units. The artillery installations are entirely lacking, [but] the electrical connections for them appear to be prepared. The equipment of the living quarters is yet to be finished. The hangar lifts are ready. The [aviation] petrol system is in process of being fitted. The covering of the parts of the ship relating to artillery and the small items of equipment are lacking. The navigation fittings are all ready… The impression is given that she is 85 per cent ready.

This was as close to becoming an operational warship as the *Graf Zeppelin* would ever get.

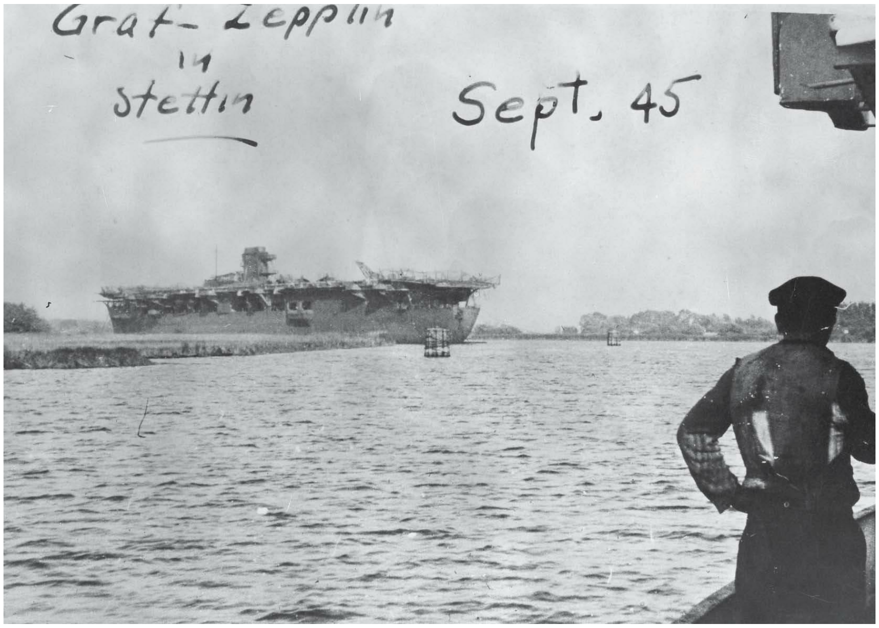
On December 31, 1942, in Operation *Regenbogen* (Rainbow), the heavy cruiser *Admiral Hipper*, armored cruiser *Lützow*, and six destroyers sortied from Altafjord in northern Norway to intercept and destroy convoy JW51B bound for Murmansk with 202 tanks, 2,046 other vehicles, 87 fighters, 33 bombers, 10,400 tons of gasoline, 11,480 tons of aviation fuel, and 49,000 tons of other supplies. In rough seas, terrible weather, and the mid-winter twilight the Nazi task force struggled to locate the 14-ship convoy but instead stumbled into its escort, the light cruisers HMS *Sheffield* and *Jamaica* and five destroyers. The smaller British warships fought a spirited defense, damaging the *Hipper* and sinking one German destroyer, and the task force returned to Altafjord empty-handed.

Already reeling from and enraged by the encirclement and decimation of the Wehrmacht's Sixth Army at Stalingrad – besieged since November 23, 1942, 107,800 troops would surrender between January 31 and February 2, 1943 – the Kriegsmarine's defeat sent Hitler into an apoplectic rage. Having lost all confidence in Raeder and his expensive fleet of surface warships, on January 6 he vented his spleen in a furious 90-minute rant, saying "the big ships are worthless and cannot do anything without air cover and smaller ships as escorts."

Hitler ordered all major fleet units "paid off" and their big guns mounted in the "Atlantic Wall" and other coastal defenses. Specifically, he ordered:

> 1. All work on heavy ships now building or in the process of conversion is to cease forthwith,
> 2. All battleships, armored cruisers and other cruisers, other than those needed for training purposes, are to be placed in reserve, and
> 3. Naval personnel, workmen, etc., who become available as a result of this directive are to be employed… to accelerate the building and repair of U-boats.

On April 21, the great gray bulk of Germany's only aircraft carrier was towed from Kiel to Stettin, arriving two days later. It was towed up the Mönne estuary (a branch of the Oder) and anchored in a bend in the river, with only 2ft (0.6m) of water beneath the keel. The dream of carrier naval aviation for the Kriegsmarine had finally come to an end.



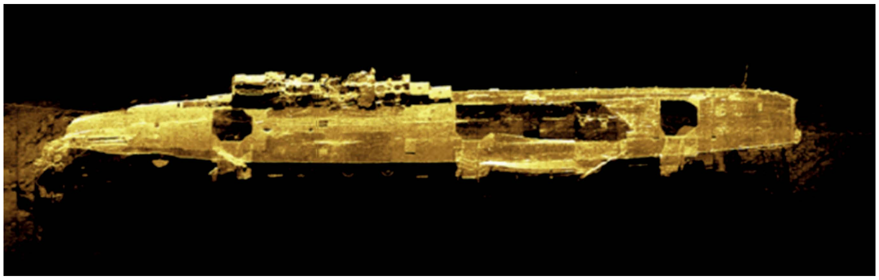
During the postwar period, agencies from the victorious Allied nations roamed the four German occupation zones gathering as much information about their defeated foe as possible. In September 1945 a US Navy intelligence team visited the *Graf Zeppelin*, inspecting it after Soviet naval engineers had refloated it, raising it from the mud of the Mönne River. (US Navy Photo NH78310)

The fateful meeting also resulted in the resignation of Admiral Raeder. In his final report to his Führer, he stated – among other important points – that:

> The lack of adequate air forces for reconnaissance and cover, and the fact that it has not proved possible to add air power in the form of aircraft carriers to the fighting powers of the [battle fleet has] imposed sharp limitations on the manner in which the OKM could employ the fleet as a corporate entity and have acted as an impediment on the prospects of achieving success.

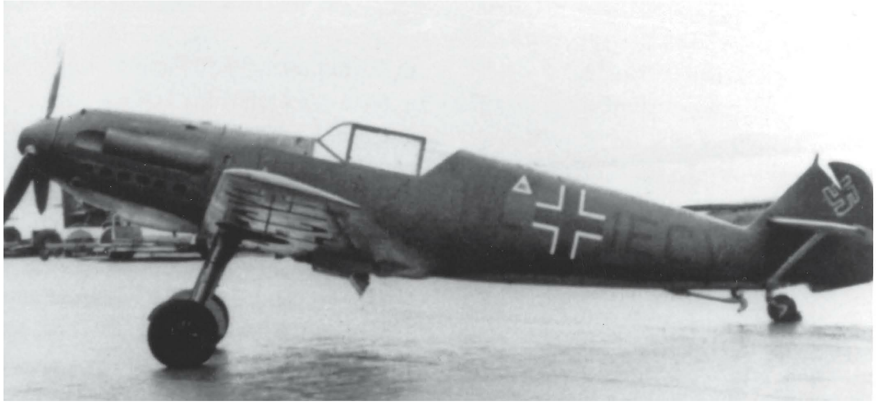
Forlorn and forgotten, the *Graf Zeppelin* lay moribund in a bend of the Mönne River for exactly a year, until the unrelenting Soviet Red Army approached from the East and on April 25, 1945, the dream of Nazi naval air power succumbed to its sad reality – it was not to be. Scuttled, it settled into the mud of the Mönne and large explosive charges were detonated, wrecking the boilers, turbine rooms, electrical generators, airplane elevators, and opening the hull to the sea. After the Third Reich collapsed and surrendered on May 7–8, the Soviets filled the vacuum; discovering the scuttled hulk, their naval engineers set to refloat the vessel, repairing its ruptured hull and by August 1945 it was afloat once again.

After evaluating it, Soviet naval staff determined that they would never be able to make the *Graf Zeppelin* into a useable aircraft carrier, but they did come up with a useful purpose for the derelict vessel. Desiring to test the effectiveness of their naval and air force ordnance against aircraft carriers – a warship type that the Soviets' erstwhile American and British Allies had in abundance – the ship became "experimental platform" PO-101. On August 16, 1947 it was towed from Świnoujście (formerly German Swinemünde) to a point approximately 40–45nmi miles out to sea and for the next two days it was subjected to the detonation of 1,000kg bombs and 18cm naval artillery shells to determine the damage done, and used as a target by the Soviet air force – who obtained six hits out of 100 bombs – and finally sunk by torpedo attacks from three Soviet destroyers.



The hulk of the *Graf Zeppelin*, bombed and torpedoed as a Soviet weapons testing target, now lies at the bottom of the Baltic Sea some 30 miles (50km) off the Polish coast. On July 12, 2006, while making soundings for oil deposits in the Baltic, the Polish oil company Petrobaltic's research vessel *St. Barbara* discovered the long-lost Nazi aircraft carrier lying in 264ft (80.5m) of water, approximately 30nmi (55km) north of Władysławowo, Poland. (Photo Courtesy MDPI, Basel, and Artur Grządziel)

The death of the dream came at 1808hrs on August 18, 1947 when the could-have-been-great warship slipped bow-first beneath the cold waves of the Baltic Sea and sank in 264ft (80.5m) of water approximately 30nmi (55km) off Poland's northern coast, between Łeba and Władysławowo.



In addition to two *Versuchsmaschinen,* three Bf 109Es were modified for arresting gear trials at E-Stelle (See). This example – initially coded WL+IECY, later TK+HL – was a Bf 109E-0 with DB 600G-2 engine and was used to test the small diameter (2.8m) VDM propeller in the hope that it would reduce damage to the deck and propeller/engine in the all-too-frequent "tip ups" experienced during arrestor cable engagement trials. (Douglas Dildy Collection)

German carrier aircraft

Despite the bitterly acrimonious debates between Großadmiral Raeder and Hermann Göring, the imperious leader of the Luftwaffe – and by their minions beneath them – the RLM did its part to stock the navy's carrier with defensive fighters and, initially, dual-role reconnaissance/bomber aircraft. Showing a preference for defense, the original complement was to be 30 Arado Ar 197 biplane fighters and a dozen Ar 95 three-seat reconnaissance-bombers.

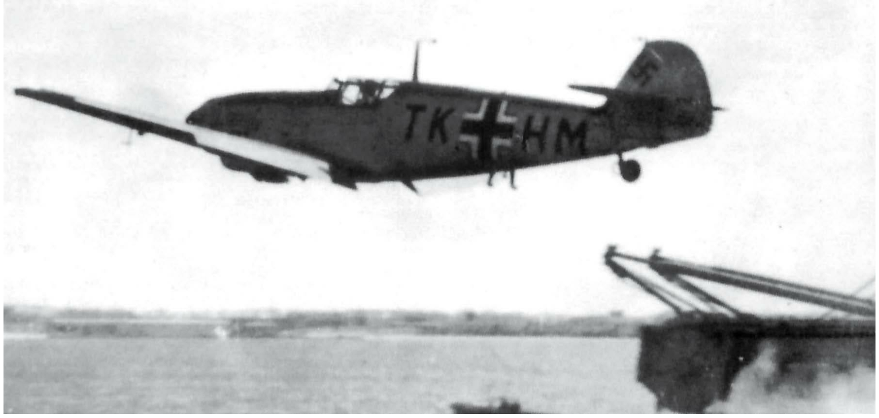
Messerschmitt Bf 109T "Toni"

The Ar 197 proved to be heavy, underpowered, and slow and was rejected by the RLM, which turned to the increasingly successful high-performance Messerschmitt Bf 109 design to fill the carrier-based fighter requirement. In October 1937 the tenth "Emil" prototype, or *Versuchsmaschine* (Bf 109V-17 W.Nr. 1776/TK+HK), was reserved for development as a ship-borne fighter, making its first flight on February 28, 1938. It was followed by a second (Bf 109V-17a W.Nr. 301/TK+HM), which mounted the Messerschmitt-designed 70cm tailhook.

Beginning in January 1939, these two – plus three modified Bf 109Es – were used to evaluate the landing gear modifications and arrestor hook design in numerous landing, taxi, and arrestor hook trials at Erprobungsstelle (See) (Research Station (Sea), commonly abbreviated E-Stelle (See)) at Travemünde, the Luftwaffe's experimental site for developing naval aircraft.

Eventually these were joined by the definitive Bf 109T-1 ("T" for "*Träger*" or "carrier;" Bf 109E W.Nr. 6153/CK+NC) prototype – first flown March 26, 1940 – and seven "pre-production" test articles during January–March 1941. The bevy of Bf 109s conducted almost 500 arrested landings using the production-standard 18mm-thick DEMAG arrestor cables on Travemünde's 800–900m (2,625–2953ft) simulated "carrier deck."

Rather than disrupt Messerschmitt's Bf 109E assembly line, in November 1940 the RLM ordered Gerhard Fieseler Werke GmbH to produce 70 Bf 109T-1s to equip the *Graf Zeppelin*'s fighter group, II.(J)/Trägergruppe 186. The most obvious change from the basic "Emil" was the increase in wingspan, the enlarged wing area decreasing take-off distance and the lengthened aileron span improving low-speed handling for landings. Flap travel was also increased, a tailhook and four catapult-cradle attach points were added, and a life raft was installed behind the pilot's headrest. Additionally, to "kill lift" on demand and enable precision landings, spoilers were added to the inboard section of the wing. The "Toni" was to be fitted with the DB 601N engine which had a higher compression ratio and used 100 octane (C3) aviation fuel to produce 1,175hp for better take-off performance. To enable the pilot to better endure the sudden accelerations of catapult launches, a thicker headrest and seat arm rests were provided.



The second Bf 109 developmental aircraft was the modified Bf 109B TK+HM, redesignated Bf 109V-17a once it was completed. It was used for catapult launch trials, using the Heinkel-built system mounted on a barge at Travemünde. Note the "L-shaped" aft catapult cradle attach-points beneath the empennage. (Douglas Dildy Collection)

Two-thirds of the 63 production Bf 109Ts were issued to the three squadrons of I./JG 77, at Stavanger/Sola and the remaining 21 to *Jagdgruppe Drontheim* (Fighter Group Trondheim), a four-squadron fighter training organization based at three Trondheim airfields. Seen here, a "Toni" belonging to I./JG 77's 3. Staffel undergoes maintenance at the squadron's Herdla airfield near Bergen, Norway. The "Toni's" extra-long wings are apparent in this view. (Douglas Dildy Collection)

Finally, the longer-range Telefunken FuG VII (30-mile/50km air-to-ground/ship range) radio/telephone was provided, as well as a FuG 25 IFF transponder, and a large, more sensitive and stable Patin master compass. These features allowed the "Toni" pilot to fly with confidence over the featureless sea and remain orientated in relationship to the carrier as well as be vectored by the carrier's radar operators for intercepts, and to return to ship.

The Bf 109T was equipped with the standard Bf 109E-7 armament: a pair of Rheinmetall-Borsig MG 17 7.92mm machine guns mounted atop the engine and two Ikaria-Berlin MG FF 20mm cannon in the wings. Aimed through a Reflexvisier 12 gunsight, the MG 17s were adequate against contemporary fighters and the Royal Navy's Fleet Air Arm fabric-covered Fairey Swordfish biplane torpedo bombers with the 20mm cannon typically being used against larger, more modern twin-engine bombers.

The first Bf 109T-1 (W.Nr. 7728/RB+OA) rolled out of the Fieseler factory in January 1941, but by the time the type's operational trials were completed, Raeder had ordered the *Graf Zeppelin* placed into temporary storage at Gdynia. With its longer, glider-like wings and more powerful DB 601N engine, the type was perfect from operating from the small, confined airfields ensconced in the narrow Norwegian fjords, so Fieseler was ordered to complete the 63 production examples as the land-based T-2 version, having the tailhooks and launching cradle attach-points removed.

In June 1941 the 63 "land-based Tonis" were delivered to I./Jagdgeschwader 77 (Fighter Wing 77 or I./JG 77) at Stavanger, Norway, a new unit specifically formed to defend Norwegian-based Kriegsmarine warships from RAF attacks, and *Jagdgruppe Drontheim* (Fighter Group Trondheim), the command's fighter training unit. The "Toni" proved itself imminently capable in its intended role; in six months of combat I./JG 77 destroyed 21 RAF twin-engine maritime patrol and torpedo/bomber aircraft, three four-engine Boeing Fortress I heavy bombers, and two high-flying photo-reconnaissance airplanes.

In April 1943, the Kriegsmarine released to the Luftwaffe the 52 Bf 109Ts held in storage at Pillau airfield, 32 were reserved for *Reichsluftverteidigung* (aerial defense of the Reich) duties and another 17 were assigned to *Nachtjagdgruppe 101* (Night Fighter Group 101), one squadron of which specialized in *Wild Sau* (Wild Boar) single engine night-fighter training based at Manching airfield, near Ingolstadt in southern Germany. (Douglas Dildy Collection)

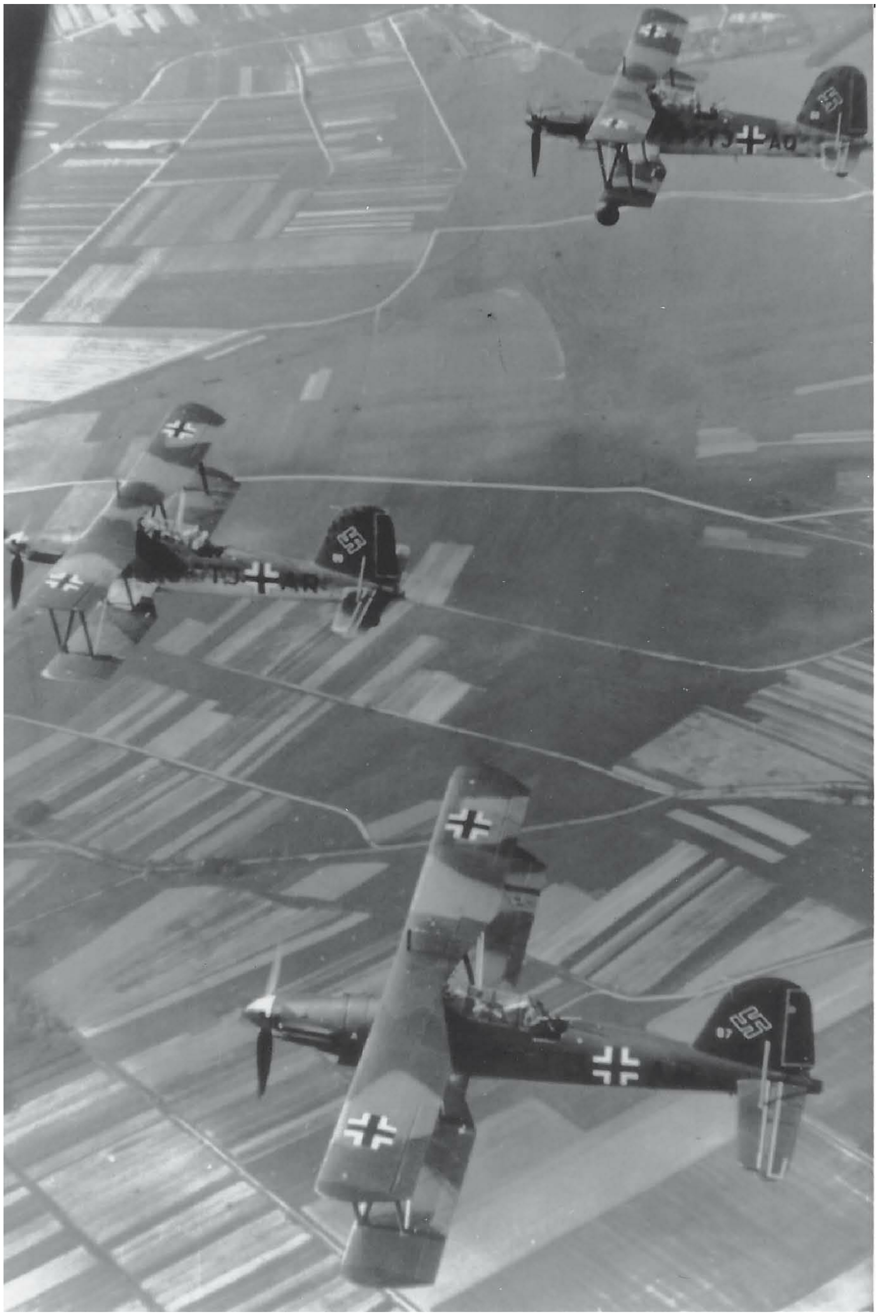
Anticipating Hitler's decision to resume work on the *Graf Zeppelin*, in December 1941 the Luftwaffe withdrew the 47 remaining "Tonis" from combat operations to convert them to the ship-based T-1 standard and store them awaiting the completion of their carrier. Following overhaul and reconfiguration back to the T-1 standard, they were ferried to Pillau-Neutief airfield near Königsberg, East Prussia, for storage, where they were joined by five pre-production Bf 109T-1s from E-Stelle (See).

Winning multi-role design, Fieseler's excellent Fi 167A. Imbued with Fieseler's innovative short take-off and landing (STOL) capabilities the type had excellent slow-speed handling characteristics, and with the carrier making 30kt into a 10kt wind, the aircraft could practically descend vertically to alight on its deck. (Douglas Dildy Collection)

Following Hitler's January 6, 1943 decision to "pay off" the *Graf Zeppelin*, the RLM ordered the 52 "Tonis" returned to T-2 standard and issued to Luftwaffe air defense units to help counter the increasing Allied day and night bombing of the Third Reich. In April that year, 11 were used to establish *Jagdstaffel Helgoland* (Fighter Squadron Helgoland), a component of II./JG 11 that was based on the tiny island of Düne, located 29 miles (47km) offshore at the mouth of the German Bight. That summer–autumn, "Jasta Helgoland" was heavily engaged intercepting US Army Air Force (USAAF) bombing raids. In six months the squadron shot down 12 B-17s and three B-24s – and lost 14 "Tonis" – before the arrival of American escort fighters forced its withdrawal. The type's light armament could not compete effectively with the bomber formations' heavy defensive fire and its performance was outclassed by escorting P-47s and P-51s. Withdrawing to Lister, Norway, in October 1943 and redesignated 11./JG 11, the unit used 21 Bf 109T-2s to protect German shipping in the Skagerrak – downing three more twin-engine RAF maritime strike aircraft and two more USAAF B-17s – until the type was withdrawn from combat in August 1944.

Fieseler Fi 167A

Following the rejection of the heavy, underpowered Ar 95 three-place biplane reconnaissance-bomber, in 1937 the RLM issued an all-new specification: a ship-borne multi-role aircraft (*Mehrzweck-Flugzeug*) capable of reconnaissance, dive bombing, level bombing, launching torpedoes, and antisubmarine patrol/dropping depth charges. Beating out the revised Arado design – the Ar 195 – the winner was the Fieseler Fi 167, a very large, spindly-looking biplane that was powered by the 12-cylinder 1,100hp Daimler-Benz DB 601B liquid-cooled engine and could carry twice the required load – a 1,487lb (700kg) torpedo – at higher than the specified speed.

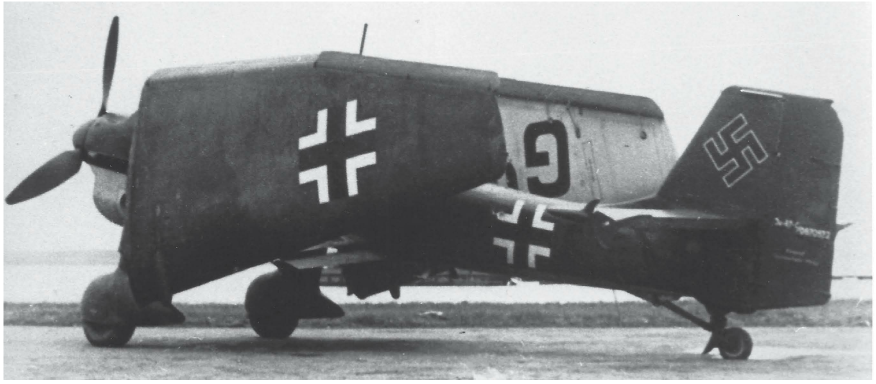


In May 1942, ESt 167 was re-established and deployed to a Dutch airfield to conduct operational evaluations, the most significant being testing various camouflage colors and patterns for use at low-altitude torpedo deliveries over the North Sea. (Douglas Dildy Collection)

By the end of 1938 Fieseler was contracted to build a dozen pre-production Fi 167A-0s, but shortly afterwards the small company was also directed to open an assembly line producing the new and much-needed Bf 109E.

Consequently, the Fi 167's production priority was low and it took Fieseler two years to build the 12 pre-production examples.

Following the successful trials of three prototypes (Fi 167V-1 through V-3), the first example of the Fi 167A-0 (W.Nr. 167005/TJ+AN) passed its RLM acceptance flight on May 22, 1940. Two A-0s were assigned to E-Stelle (See) to supplement the three prototypes participating in the ongoing arresting-gear trials and one was sent to the Daimler-Benz engine test center at Echterdingen. The other nine examples were used to form a small operational trials unit called Erprobungsstaffel 167 (Evaluation Squadron 167, commonly abbreviated ESt 167) at Travemünde. This unit conducted flying and operational tests until the aircraft were recalled, to be placed in storage, in December 1941.



To provide the *Graf Zeppelin*'s dive-bomber capability the RLM had Junkers navalize the dreaded Stuka. Following two developmental machines – called *Versuchsmaschinen* – one prototype Ju 87C-0 and four Ju 87C-1 pre-production examples were built. The definitive Ju 87 C-0 prototype (GD+FB) – called a *Musterflugzeug* (master aircraft) – featured folding wings, arresting hook, catapult cradle attach-points, jettisonable landing gear, a two-man dinghy, and flotation devices. (Douglas Dildy Collection)

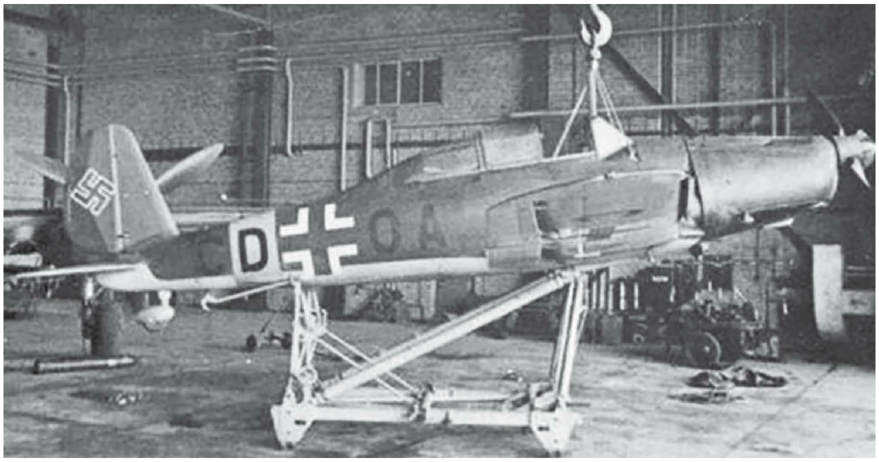
However, in the spring of the following year, Hitler, Raeder, and the Kriegsmarine decided to complete the *Graf Zeppelin* after all, but by then major changes had to be ordered in their planned carrier aviation program. One of these was that the Luftwaffe staff decided that the Fieseler biplane was now obsolete and no longer a viable – or survivable – component of the carrier air group, so the Fi 167A-0s were released from storage and nine of them were used to re-establish ESt 167.

By mid-1943 the large, elegant Fieseler biplanes were completely obsolete for modern combat and, being excess to the Luftwaffe's needs, the dozen Fi 167A-0s were transferred to Croatia where the Nazi-puppet government used them to combat Tito's communist partisans. The government ruled the cities while the communists controlled the countryside, besieging the oppressive regime's isolated outposts, but the Fieseler's great load-carrying capability and outstanding short take-off and landing capabilities made it perfect for resupplying them. Three were lost in combat (two to roving RAF and South African Air Force Mustangs) before the Croatian capital was liberated by the Soviets on May 6, 1944, two days before Nazi Germany surrendered.

Junkers Ju 87C and E *"Trägerstukas"*

In 1938, the Fi 167A possessed the potential to be an excellent counterpart to the Royal Navy's Fairey Swordfish reconnaissance/torpedo bomber. However, the Ju 87 Stuka's highly successful combat debut in the Spanish Civil War made it the obvious choice for the carrier's dive-bomber requirement.

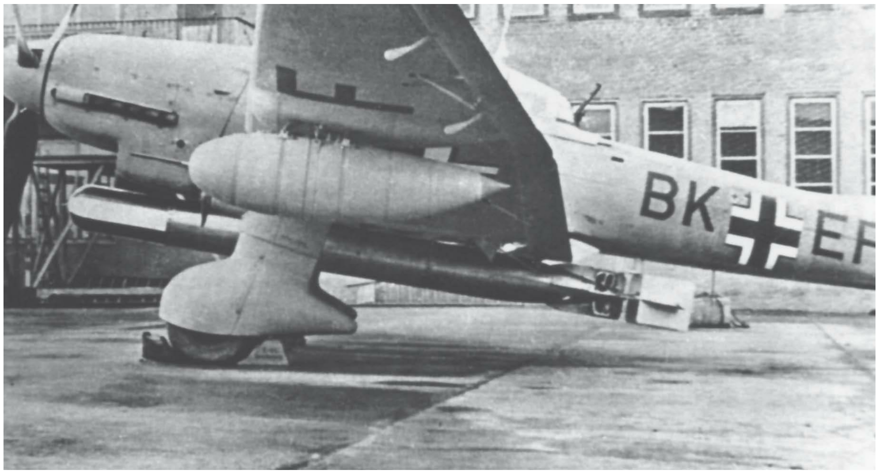
Two prototypes were built. Ju 87V-10 (W.Nr. 4928/TK+HD) was used to evaluate the various fuselage, arresting hook, and landing gear modifications as well as the installation of flotation bags in the underwing panels, life rafts, and other sea survival equipment. Ju 87V-11 (W.Nr. 4929/TV+OD) was used to develop the double-jointed wing folding mechanism that allowed the wings to be tucked in alongside the empennage. This significantly reduced the large aircraft's "footprint," enabling use of the ship's elevators and storage below decks.



The RLM also ordered the Czechoslovakian Aero company to produce a navalized version of the Luftwaffe's advanced flying trainer, the Arado Ar 96B-1. The prototype (W.Nr 964553/CD+OA), seen here on one of the catapult launching cradles at Travemünde in March 1943, was followed by five pre-production examples, designated Ar 96B-1/T, all sent to E-Stelle (See) for pilot catapult and arrested landings training. When the station's Ju 87C-1 (CD+FB) was sent to the *Regia Aeronautica* for the Italian navy's carrier development, two Ar

96B-1/Ts (the prototype and PH+GZ) and a complete set of DEMAG arresting gear were also sent to San Egidio airfield near Perugia, home of the *Regia Aeronautica's Velivoli Imarcati* (Carrier Flying School). (Douglas Dildy Collection)

In April 1939, Junkers began modifying five "Bertas" (Ju 87Bs) at the Templehof factory in Berlin. One (W.Nr. 0423/GD+FB) became the definitive Ju 87C-0 prototype or *Musterflugzeug* (master aircraft), equipped with folding wings, arresting hook, catapult cradle attach points, jettisonable landing gear, a two-man dinghy, and underwing flotation bags. The four others were completed as the improved C-1 version. The two *Versuchsmaschinen* (V-10 and V-11), the *Musterflugzeug* (C-0), and one "Caesar" (C-1 W.Nr. 0572/CD+FB) were all eventually transferred to E-Stelle (See) for catapult launch and arrested landing trials.



The Junkers Ju 87E Stuka was expected to replace the obsolete Fi 167A as the *Graf Zeppelin*'s multi-role combat aircraft, including the ability to deliver torpedo attacks using the Luftwaffe's LT F5b or (Italian-made) F5W torpedoes. The second prototype, Ju 87V-25 (BK+EF) arrived at E-Stelle (See) in September 1941 to begin its carrier compatibility trials. Fully loaded, it quickly proved to be too heavy for the *Graf Zeppelin*'s catapults, elevators, and arresting gear, preventing its use as a torpedo bomber and limiting its role as a dive bomber to delivering a single 1100.5lb (500kg) bomb. (Douglas Dildy Collection)

To equip two Stuka squadrons to be embarked upon each of the four carriers proposed in "Plan Z," in August 1939 the RLM ordered 120 Ju 87C-1s. However, with Hitler initiating hostilities the next month, the tectonic shifts in the Kriegsmarine's priorities caused the RLM to reduce the requirement to only 30 "Caesars," just enough to equip *Graf Zeppelin*'s dive-bomber group, I.(St)/Trägergruppe 186.

In March 1942, when the *Graf Zeppelin* project was revived the OKM and RLM revised the planned composition of its air group. The 18 Fi 167As and 13 Ju 87Cs were to be replaced by 28 examples of the improved *Trägerstuka*, the Ju 87E. Horrendous Stuka losses in the Battle of Britain had prompted the Junkers Flugzeug- und Motorenwerke AG to significantly improve the type, creating an aerodynamically cleaner design with increased armor protection and larger fuel tanks and powered by a 1,400hp Jumo 211J engine, increasing the bombload up to 4,000lb (1,800kg), to become the Ju 87D model.

One prototype "Dora" (Ju 87V-24 W.Nr. 087-0544/BK+EE) was modified with wing folding mechanism, arresting hook, and overwater safety features to become the carrier-based Ju 87E dive bomber prototype, while a second (Ju 87V-25 W.Nr. 087-0538/BK+EF) was modified to carry the Luftwaffe's 1,653–1,995lb (750–905kg) LT F5 series torpedo. Upon completion these two, plus two "Dora" models, were sent to E-Stelle (See) in autumn 1942 for extensive carrier-related trials

Junkers Ju 87E specifications	
Dimensions	length: 11m wingspan: 13.8m
Powerplant	one 1,410hp Jumo 211J engine
Maximum speed	354km/h
Range	600km
Armament	three 7.92mm MG 17 machine guns
Payload	one 1,000kg armour-piercing and four 50kg anti-personnel bombs or one 905kg LT F5b torpedo
Crew	two

Despite the fact that the tests proved that neither *Graf Zeppelin*'s catapult system nor its arresting gear could cope with the 13,228lb (6,000kg) "Dora" derivatives, the Ju 87E was viewed as the carrier's new *Mehrzweck-Flugzeug* and the OKM requested that the RLM provide 54 examples – enough for the unfinished fleet carrier and the four proposed auxiliary carriers then being discussed. The RLM in fact ordered 95, with deliveries scheduled to commence in 1944.

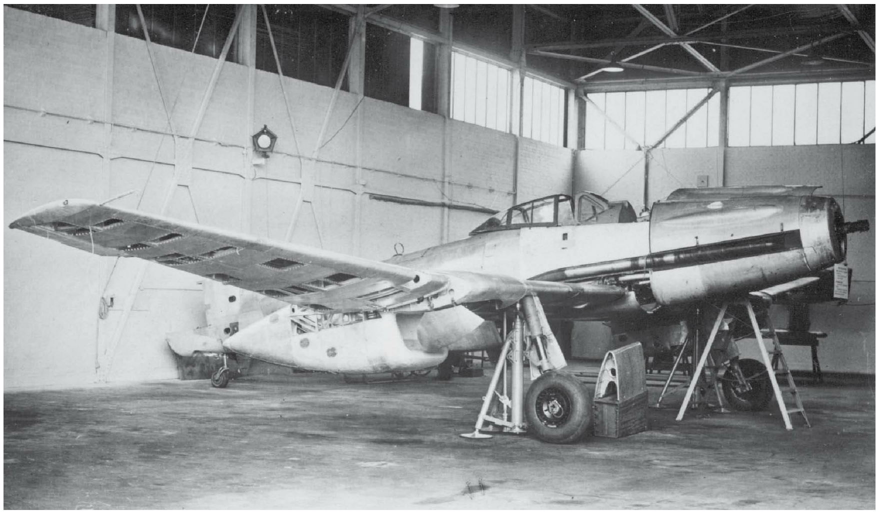
Needless to say, in January that year when the Nazis' carrier program was scrapped altogether, the Ju 87E order was canceled as well.

Messerschmitt Me 155

Because the Bf 109T was quickly surpassed by the Allies' more modern fighters, when the *Graf Zeppelin* was revived in the spring of 1942 the RLM directed that Messerschmitt develop a new design for a ship-borne fighter. It was initially referred to as the "Bf 109ST," the RLM issuing the project number 8-155 for the specification. General arrangements for the Me 155 were completed by September that year and, to relieve Messerschmitt's overworked design teams at the Augsburg office, the detailed design work was assigned to the Vichy Société Nationale de Constructions Aéronautiques du Nord (SNCAN) offices near Villacoublay airfield, located just outside Paris. To assist the French designers and engineers in adapting Messerschmitt's proven carrier-specific components to the Me 155, the pre-production Bf 109T-1 at E-Stelle (See) (W.Nr. 7728/RB+OA) was flown from Travemünde to Villacoublay in December 1942.

Messerschmitt Me 155 specifications	
Dimensions	length: 8.9m wingspan: 20.5m
Powerplant	one 1,455hp Daimler-Benz DB 605A-1 engine
Maximum speed	649km/h
Range	460km
Ceiling	12,000m
Armament	three MG 151 20mm cannon and two MG 131 13mm machine guns

In the interest of economy and simplicity, the Me 155 was to use as many Bf 109 components as possible. The fuselage was more or less that of the standard Me 109G, married to an entirely new, high-aspect (glider-like) wing. The new wide-span wing allowed the inclusion of a wide-track, inward retracting, FW 190-style undercarriage, providing much improved handling as needed for carrier landings. Standard naval equipment such as folding wings, catapult "horns," and arresting gear hook were to be fitted. The new carrier fighter was to be armed with three 20mm MG 151 cannons and a pair of 13mm MG 131 machine guns. Powered by the new DB 605A-1 engine of 1,455hp, it had an estimated maximum speed of 403mph (649km/h). The OKM informed the RLM that it would need 48 examples of the type.

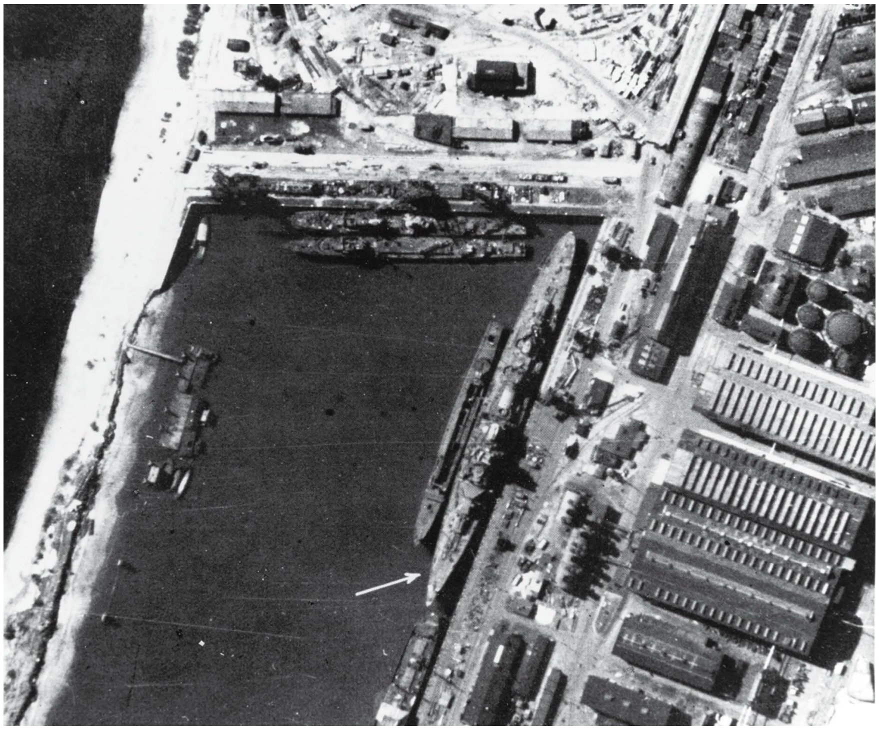


The Me 155 ship-board fighter was proposed to replace the Bf 109T-1 Messerschmitt. The design was developed during 1942 by the French aeronautical firm SNCAN, but the protracted prototype construction and testing schedule meant that the 48 examples needed would not be produced until 1946. When the *Graf Zeppelin* was canceled altogether, the design was turned over to Blohm & Voss for development into a high-altitude interceptor to combat the USAAF B-29 Superfortress bomber. (Douglas Dildy Collection)

However, in November 1942 it was determined that the Me 155A would not be ready for operational deployment until 1946 which meant that, if the carrier could be completed in the winter of 1943/44, the Bf 109T-1s in storage at Pillau would have to suffice until the new fighter arrived to replace them. When the carrier project was finally canceled, the project was transferred to Blohm & Voss where, as the BV 155, it was redesigned as a high-altitude interceptor to combat the USAAF's Boeing B-29 Superfortress.

Wartime auxiliary carrier conversion projects

In May 1942 Hitler's anxious new-found need for carrier aviation resulted in his order to convert four ships languishing in German ports into aircraft carriers. Three of these were ocean liners and the fourth was the unfinished Hipper-class heavy cruiser, KMS *Seydlitz*. Of the liners – SS *Europa, Potsdam*, and *Gneisenau* – the one with the greatest potential was the Norddeutscher Lloyd line's high-speed steamship *Europa*.



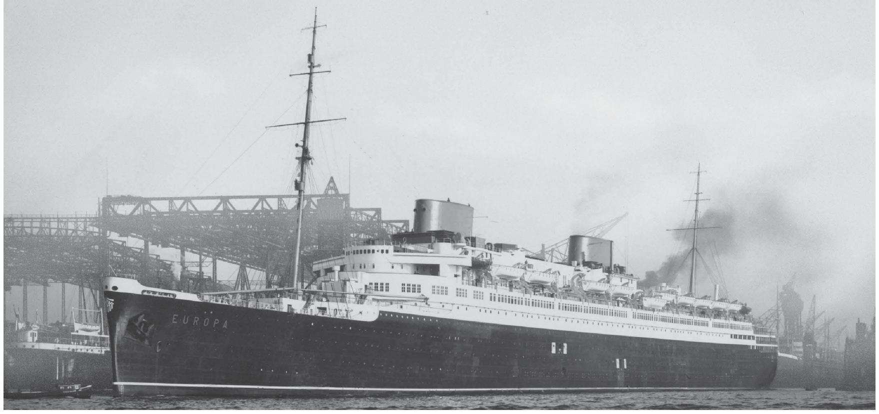
In March 1942, Adolf Hitler belatedly and finally recognized the value of carrier-based naval aviation and authorized the carrier conversion of the 18,000-ton Hipper-class heavy cruiser *Seydlitz* that was 90 percent complete; the ship was to be named KMS *Weser* upon commissioning. Photographed by a high-altitude RAF reconnaissance aircraft in May 1942, it can be seen moored to a pier in the Deschimag Shipyard at Bremen, its main armament clearly evident. (US Navy Photo NH 91659)

Design work for the conversions – done by the OKM's *Hauptamt Kriegsschiffbau* (Head Department of Warship Construction, formerly known as the K-Amt) – was begun immediately after Hitler's May 13, 1942 decision, with the *Seydlitz* and *Europa* being given priority.

Built by AG Weser and launched on January 19, 1939, the 18,000-ton cruiser was 90 percent complete, including its heavy armament, and was moored at a pier at Bremen. To begin the conversion, its heavy guns were removed and its superstructure was dismantled down to the flight deck level, stripping the ship of approximately 2,400 tons of steel. The flight deck was to have been 660ft (200m) long and 98ft (30m) wide. Beneath it, the hangar was 451ft (137.5m) long and 56ft (17m) wide forward and 39ft (12m) wide amidships and aft, housing ten Stukas and ten fighters. Two elevators would move the aircraft between the hangar and flight decks and two catapults would launch them. Upon completion, it was to have been renamed the KMS *Weser*.

***Weser* specifications**	
Dimensions	length: 192.5m; beam: 24.4m; draft: 5.5m
Full displacement	11,400 tons
Machinery	three Deschimag geared steam turbines, fired by 12 high-pressure boilers, producing 130,000shp and driving three screws at a maximum speed of 32kt
Aircraft	ten Messerschmitt Bf 109T, ten Junkers Ju 87E
Catapults	two Deutsche Werke compressed air-driven catapults
Hangars	one hangar divided into four compartments
Armament	ten 10.5cm SK C/33 (L/50) antiaircraft guns ten 3.7cm SK C/30 (L/83) antiaircraft guns 24 2cm Flak C/38 (L/65) antiaircraft guns

Theoretically the best choice for converting an ocean liner into an aircraft carrier, the SS *Europa* was designated *Flugzeugträger I*. Built by Blohm & Voss shipyard in Hamburg and christened in 1928, the 62,160-ton (49,746GRT) displacement high-speed steam turbine ocean liner was designed to win the international competition for the “Blue Riband,” the prize for the fastest trans-Atlantic crossing. On its maiden voyage from Bremen to New York (March 19–24, 1930) it won the Blue Riband with the average speed of 27.9kt in a crossing time of four days, 17 hours and six minutes.



To supplement *Graf Zeppelin* and *Weser*, three passenger ships sidelined by the war were selected to be converted into “auxiliary aircraft carriers.” The largest of these was the 49,746GRT high-speed ocean liner SS *Europa*, seen here prior to its record-setting maiden voyage to New York City. Under the project designation *Flugzeugträger I,* it was designed to carry two dozen Bf 109Ts and 18 Ju 87Es. However, the practical problems of turning a passenger vessel into a warship were too great and the project was canceled in November 1942. (Ryan Noppen Collection)

***Europa* specifications**

Dimensions	length: 291m; beam: 37m; draft: 10.3m
Full displacement	56,500 tons
Machinery	four Blohm & Voss geared steam turbines, fired by 24 boilers, producing 105,000shp and driving four screws at a maximum speed of 26.5kt
Aircraft	24 Messerschmitt Bf 109T, 18 Junkers Ju 87E
Catapults	two Deutsche Werke compressed air-driven catapults
Hangars	one hangar divided into five compartments
Armament	12 10.5cm SK C/33 (L/50) antiaircraft guns 20 3.7cm SK C/30 (L/83) antiaircraft guns 28 2cm Flak C/38 (L/65) antiaircraft guns

While fast and spacious enough to operate two dozen fighters and 18 Stukas (as redesigned), significant structural modifications were required to convert a civilian passenger liner into a warship. The hull was not stressed for combat operations, much less armored, requiring waterline side bulges to be mounted to strengthen it, and concrete “armor plate” needed to be added to protect vital spaces. Once it was determined that cutting the elevator wells (or shafts) into the main deck compromised the ship’s structural integrity and that the side bulges added drag, reduced operating speed, and increased fuel consumption, the project became far less promising. Consequently, it was canceled on November 25, 1942.

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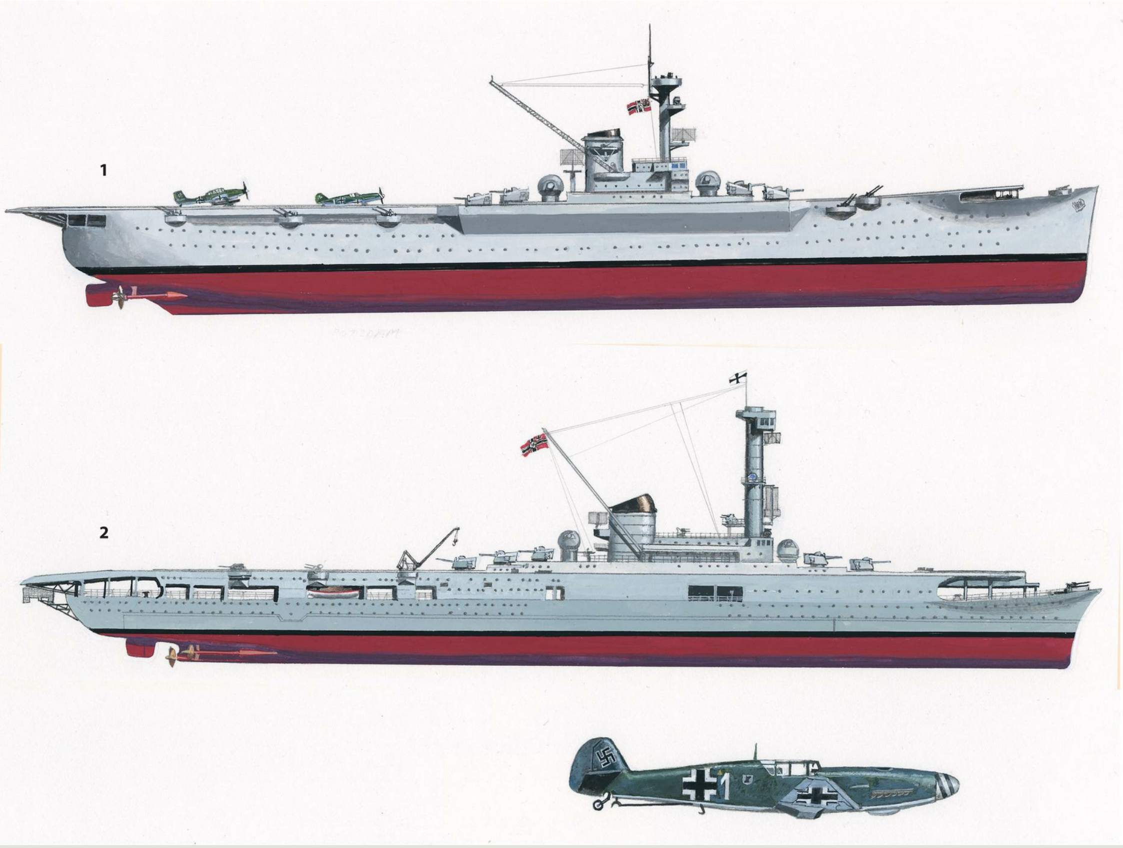

1. *Elbe* Training Carrier Conversion Project

Two other Norddeutscher Lloyd liners, the sisterships *Gneisenau* and *Potsdam*, were considered for conversion at the same time as *Europa*. The need for significant structural changes and the 21kt maximum speed of the vessels brought their preliminary conversion designs to an end at the same time as *Europa*'s. *Potsdam* was found suitable for conversion into a training carrier and, rechristened *Elbe*; amended plans were drawn up. Ironically, the third sistership of *Gneisenau* and *Potsdam, Scharnhorst*, was caught in Japan when World War II began and was converted by the Imperial Japanese Navy into an escort carrier, renamed *Shinyo. Elbe* is shown here according to its training carrier design.

2. *Weser* Aircraft Carrier Conversion Project

Intended to have been built on the hull of the unfinished heavy cruiser *Seydlitz*, the *Weser* carrier conversion would have been able to take advantage of *Seydlitz*'s powerful machinery and fast maximum speed of 32kt. A drawback of *Weser* would have been the cruiser's beam which was the narrowest of the Kriegsmarine's carrier conversion projects. The narrow hangar would have only allowed for an air wing of 20 aircraft. *Weser* is shown here according to its conversion plan as well as the proposed Messerschmitt Me 155 fighter, intended to replace the Bf 109T in 1946.

Because the two smaller, slower (18,000-ton/21kt) liners – known as the Jade-class auxiliary aircraft carriers – had the same redesign and conversion problems, work on SS *Gneisenau* was halted the same day and it was decided to convert SS *Potsdam* into a non-combat training carrier, renamed the KMS *Elbe.* The ship was towed from Hamburg to Kiel in December, where Blohm & Voss began the conversion by removing the passenger cabins. A month later Hitler's final decision brought work to an abrupt halt.

***Elbe* specifications**	
Dimensions	length: 203m; beam: 26.8m; draft: 8.6m
Full displacement	23,400 tons
Ship's complement	900 men
Machinery	two Blohm & Voss steam turbines driving two Siemens-Schuckert electric motors, fired by four Benson high-pressure boilers, producing 26,000shp horsepower and driving two screws at a maximum speed of 21kt
Aircraft	18 Messerschmitt Bf 109T, 12 Junkers Ju 87E
Catapults	two Deutsche Werke compressed air-driven catapults
Hangars	one hangar divided into four compartments
Armament	12 10.5cm SK C/33 (L/50) antiaircraft guns; 20 3.7cm SK C/30 (L/83) antiaircraft guns; 24 2cm Flak C/38 (L/65) antiaircraft guns

The Hauptamt Kriegsschiffbau also considered converting an unfinished French light cruiser – the 11,500-ton *De Grasse* – into an auxiliary carrier designated *Flugzeugträger II*. The first of its class, the *De Grasse* was laid down at the Arsenal de Lorient shipyard in August 1939 and was captured 28 percent complete in June the next year.

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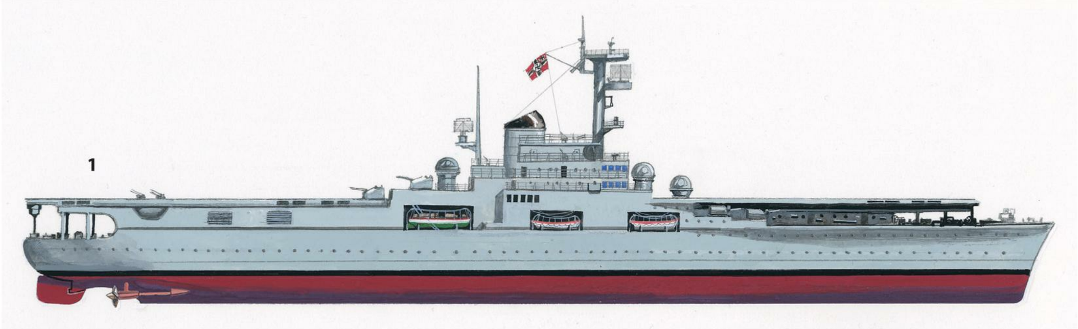
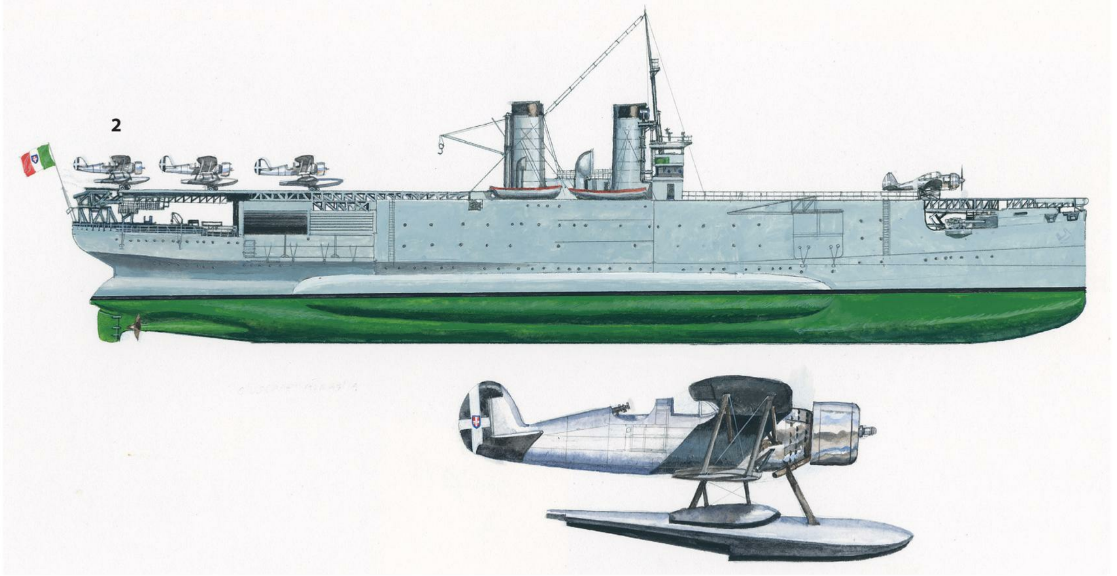


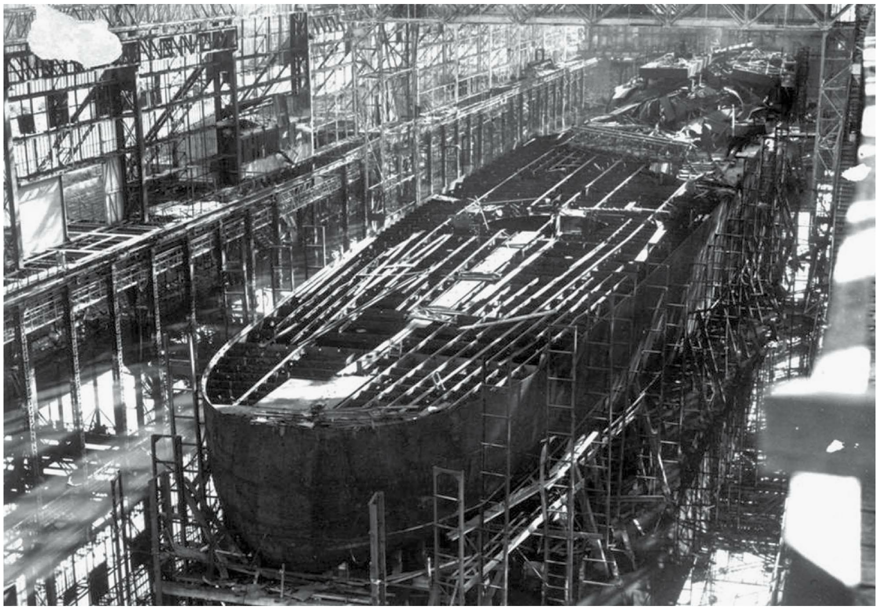


1. *De Grasse* Aircraft Carrier Conversion Project

On paper, the French light cruiser *De Grasse* seemed to be a good selection for conversion into an auxiliary carrier as its intended capabilities and performance would have been very similar to those of *Weser*. The problem with *De Grasse* was that it required extensive work and materials as it was only 28 percent complete when captured in June 1940 and no work had been done on it since. Specialized labor and materials from Germany could not be immediately spared and it was quickly found after work did recommence on it in December 1942 that French labor in the Lorient shipyard was less than willing to make any special effort on the vessel. After its conversion was canceled in February 1943, the unfinished *De Grasse* was left largely untouched for the remainder of the war and was launched to clear its slipway in 1946. After sitting idle for another five years, its hull was towed to the Arsenal de Brest shipyard where it was completed as an antiaircraft cruiser in 1956.

2. Seaplane Carrier *Giuseppe Miraglia*

When it first entered service in November 1927, it was believed that *Giuseppe Miraglia* would be capable of launching and retrieving aircraft while underway, giving it operational capabilities beyond that of a mobile seaplane base. Aircraft could be launched from its Gagnotto pneumatic catapults while the ship was in motion and a retractable canvas drag apron was mounted on the stern, upon which seaplanes could taxi and then be retrieved by crane while the vessel was underway. The drag apron recovery system did not prove to be practical however and *Giuseppe Miraglia* was forced to stop in order to recover its aircraft. *Giuseppe Miraglia* did not participate in any combat operations during its years of service, a fact which was pounced upon by opponents of naval aviation in the Regia Aeronautica and Regia Marina. It did serve effectively as an aircraft transport during the Abyssinian War and its repair facilities were used to service the IMAM Ro.43 reconnaissance aircraft posted aboard other Regia Marina warships during World War II. Beginning in May 1942, it conducted test catapult launches of modified Reggiane Re.2000 fighters, which were later embarked aboard the Littorio-class battleships in an emergency effort to give the vessels a limited air defense capability. *Giuseppe Miraglia* is shown here in its 1942 configuration with a Re.2000 on its bow catapult and Ro.43 reconnaissance aircraft aft, and featured in the separate aircraft profile.



Replacing the *Europa* was the proposed *Flugzeugträger II* project, the conversion of the 12,350-ton French light cruiser *De Grasse* captured during the fall of France in June 1940. Being built by the Arsenal de Lorient shipyard, the ship was only 28 percent complete. Germany lacked the materials and manpower to undertake the conversion and its location well within range of UK-based Allied bombers meant it could be attacked easily and repeatedly, preventing its completion. The project was canceled in February 1943. (Ryan Noppen Collection)

***De Grasse* specifications**	
Dimensions	length: 121.2m; beam: 15m; draft: 5.8m
Full displacement	11,500 tons
Ship’s complement	196 men plus air crews
Machinery	two Rateau-Bretagne geared turbines, fired by four Indret high-pressure boilers, producing 110,000shp and driving two screws at a maximum speed of 32kt
Aircraft	11 Messerschmitt Bf 109T, 12 Junkers Ju 87E.
Catapults	two Deutsche Werke compressed air-driven catapults
Hangars	one hangar
Armament	12 10.5cm SK C/33 (L/50) antiaircraft guns; 12 3.7cm SK C/30 (L/83) antiaircraft guns; 24 2cm Flak C/38 (L/65) antiaircraft guns

It languished in the stocks until after the Flugzeugträger I project was canceled in November 1942. A week later Raeder proposed that the ship be converted to a carrier to augment the *Seydlitz*, the sole surviving auxiliary carrier project – Hitler approved the project on December 3, 1942. It was planned to operate 11 Bf 109Ts and a dozen Ju 87Es.

The project was surprisingly short-lived, however. Due to lack of shipyard workers – who could not be motivated to convert the French naval vessel into a Nazi warship anyway – severe shortage of materials, and the threat of Allied bombing (it had already been hit twice), the project was canceled in February 1943. This left the *Seydlitz* as the Kriegsmarine's only viable auxiliary carrier project.

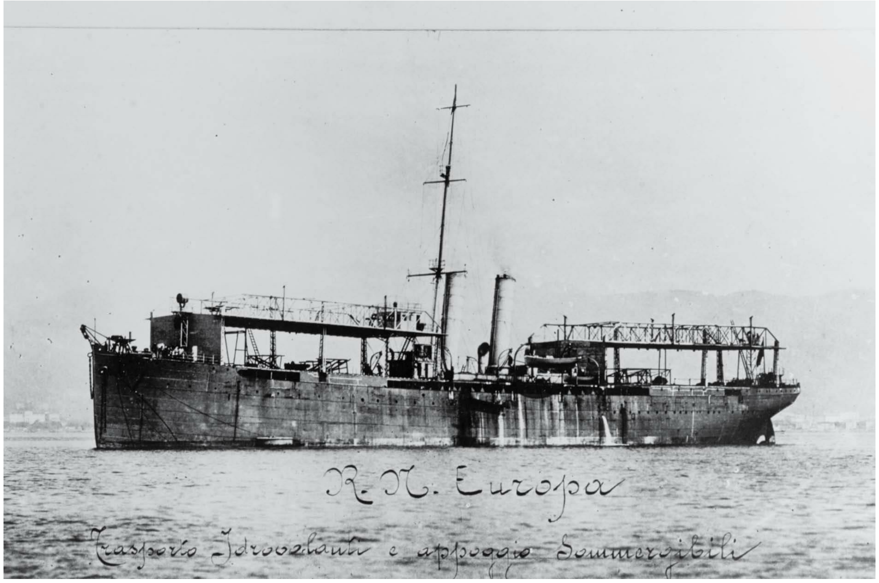
With Hitler's order to cease work on all capital ships, the conversion of *Seydlitz* was finally terminated in June 1943 and the warship was towed to Königsberg. There it was scuttled on January 29, 1945, before the advancing Red Army could seize it, but two years later, it was raised by the Soviet Navy, with the intention of finishing the ship as a heavy cruiser – to be renamed *Poltava* – to join its sistership, another incomplete Hipper-class cruiser, the *Petropavlovsk* (which was launched as the original KMS *Lützow*), acquired in 1940 as partial payment for the German–USSR agreement to split Poland the year before. However, the project was abandoned in 1950.

ITALY

Experimentation in World War I

Italy became the first nation to utilize aircraft over the battlefront when the *Regio Esercito* (Italian Royal Army), deployed early Bleriot and Etrich Taube monoplanes on reconnaissance and bombardment missions during the Italo-Turkish War in 1911–12. The Regia Marina had also embraced the new medium of aviation relatively early. In July 1913, *Viceammiraglio* Paolo Thaon di Revel became *Capo di Stato Maggiore della Marina*, or navy chief of staff. Thaon di Revel was a supporter of naval aviation and had taken notice of the innovative work of *Capitano del Genio Navale* Alessandro Guidoni. In 1912, Guidoni sketched a design to convert the protected cruiser *Piemonte* (a cruiser with an armored deck/protection scheme covering its vital spaces), commissioned in 1889, into a hybrid aircraft carrier/seaplane tender. Guidoni's design removed all of *Piemonte*'s armament aft of the funnels and replaced it with a hangar on the rear half of the vessel. Above the hangar was a 40m take-off platform angled down towards the stern. Aircraft would exit the hangar via its open sides and be lifted up to the take-off platform by a crane mounted just aft of the second funnel. Guidoni's conversion plan for *Piemonte* was not approved by Thaon di Revel's predecessor but the Admiral thought that the idea of an aviation-capable ship had merit. Thaon di Revel selected the Regioni-class protected cruiser *Elba* for conversion into an aviation vessel as it had been serving as a support ship for observation balloons since 1907 and Guidoni was tasked with its redesign. Aft of *Elba*'s second funnel, a canvas-enclosed hangar was constructed to house two seaplanes and a 30m (98.4ft) platform was installed just aft of the hangar; two additional seaplanes could be stored in the open on the platform or it could be used to support an observation balloon. The platform was not intended as a take-off deck; rather cranes would lower and retrieve the vessel's aircraft from the sea. *Elba*'s conversion was completed on June 4, 1914, and it embarked three or four Curtiss Model F flying boats. *Elba*'s slow maximum speed of 17.9kt prevented it from participating in fleet operations and it was found that its aircraft complement was too low to allow for effective reconnaissance work. *Elba* operated on a limited basis during the first half of World War I but was withdrawn from service in July 1916.

Elba’s limited capabilities were encouraging enough for Thaon di Revel to later push for a vessel which could carry and effectively operate more aircraft. Approval was granted for such a purchase in the 1915 naval budget and Guidoni was ordered to select a merchant vessel suitable for conversion. He chose the 8,666-ton cargo freighter *Quarto*, launched in Great Britain in 1895, and drew up plans for its conversion into a seaplane carrier. The ship’s superstructure was removed and two canvas-enclosed hangars were erected fore and aft of the mast and funnels, each able to accommodate four floatplanes or flying boats. A new bridge was mounted on top of the fore hangar. Cranes lowered and retrieved aircraft from the sides of the hangars, from which the canvas could be fully retracted. Below decks a workshop was installed as well as tanks for aviation fuel. Remaining space was used for the storage of up to eight disassembled aircraft, parts, and ammunition. The vessel, renamed *Europa*, entered service with the Regia Marina on October 6, 1915. From its conception, *Europa* was never intended to serve in fleet operations; its maximum speed of only 12.2kt did not allow for that. Rather its role was that of an autonomous mobile seaplane base, hence the attention given to maintenance and support facilities aboard the ship. For most of the remainder of the war it served in this role off the port of Valona, the primary base of operations for the Regio Esercito in Albania. *Europa* operated a variety of Curtiss, FBA (Franco-British Aviation Company), and Macchi flying boats throughout the war. It was decommissioned in September 1920 and subsequently scrapped.

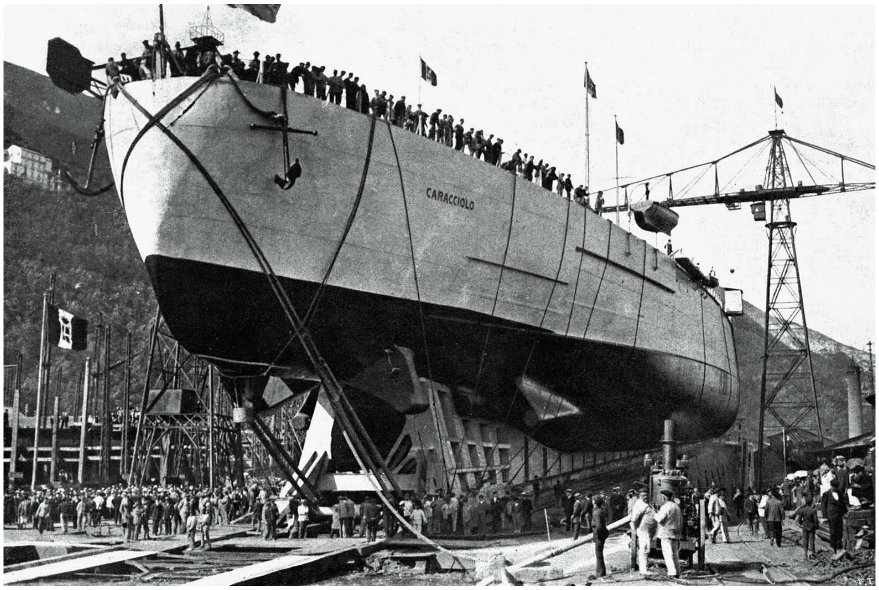


Europa, the Regia Marina's first effective aviation vessel, in service from 1915 to 1920. Note the hangars fore and aft. (Naval Heritage and Historical Command 86295)

Interwar projects

The postwar Washington Naval Treaty, designed to limit the size of the world's largest navies and signed on February 6, 1922, allowed the Regia Marina to build a number of aircraft carriers that didn't exceed a total of 60,000 tons. Thaon di Revel, who had served as Italy's naval representative to the Washington Naval Conference, was eager to make the most of this allotted tonnage and had already advocated for the development of Italian flush-deck aircraft carriers. The British Royal Navy had commissioned the world's first flush-deck aircraft carrier, HMS *Argus*, in September 1918 and as early as the following year Thaon di Revel had commissioned a proposal to convert the unfinished 34,000-ton dreadnought battleship *Francesco Caracciolo* into its first flush-deck carrier. Its conversion called for the installation of a flight deck running almost the entire length of the ship and a small island. Simultaneously, a design study was undertaken about the possibility of converting the hulk of the 25,086-ton dreadnought *Leonardo da Vinci* into a similar flush-deck carrier. Sunk due to an internal explosion in the harbor of Taranto in August 1916, likely the work of Austro-Hungarian agents, the largely intact *Leonardo da Vinci* was raised in September 1919 and moved to a drydock. Both of these ambitious projects came to an abrupt end at roughly the same time as the Washington Naval Conference, however, in the wake of the *Biennio Rosso*, or Two Red Years, a period of intense inflation and violent labor uprisings from 1919 to 1920. The economic crisis in Italy caused by wartime spending and the *Biennio Rosso* brought a reduction in the Regia Marina's budget to an amount lower than immediate prewar levels. As a result, both conversion projects were canceled and *Leonardo da Vinci* and *Francesco Caracciolo* were scrapped in 1923 and 1926 respectively.

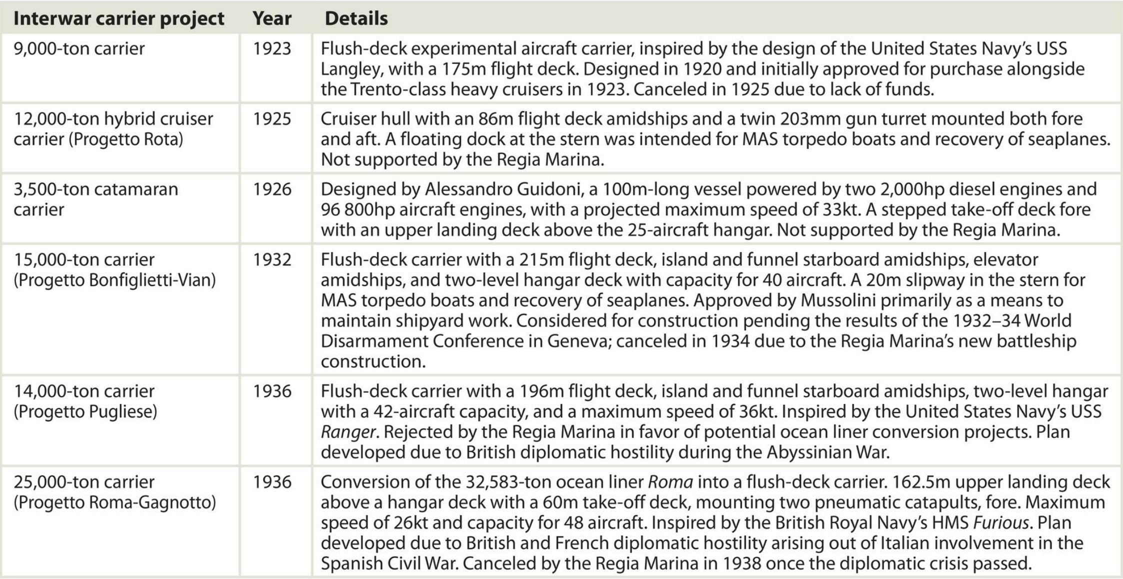
Perhaps more detrimental to the Regia Marina's development of aircraft carriers than postwar financial concerns was the fascist political environment following Benito Mussolini's rise to power. The fascist leader Italo Balbo assumed control of the *Regia Aeronautica* (Italian Air Force), becoming *Sottosegretario di Stato al Ministero dell'Aeronautica* (Undersecretary of State for the Aviation Ministry) in November 1926. Balbo had little experience in aviation matters prior to this but he quickly fell under the influence of the strategic air power theories of Guilio Douhet, particularly the potential role to be played by massed formations of bombers. After the Regia Aeronautica assumed control of most of the navy's aviation squadrons in 1931, Balbo subsequently made it clear to the Regia Marina that it had no business pursuing the development of aircraft carriers; the Regia Aeronautica would ensure the safety of the skies over Italy's *Mare Nostrum* (Mediterranean Sea). Also opposed to aircraft carrier construction was the *Sottosegretario di Stato al Ministero della Marina* (Undersecretary of State for the Naval Ministry), Ammiraglio di Squadra Domenico Cavagnari, who led the Regia Marina from 1933 to 1940. Cavagnari was not a staunch supporter of naval aviation, coming from a cadre within the Regia Marina which still viewed the battleship as the preferred projection of naval power. Cavagnari largely accepted the Regia Aeronautica's tight control over the majority of Italy's aviation assets and made little effort to fight for naval aircraft with strike potential. With regards to aircraft carriers, Cavagnari was quoted in 1938 as saying before political leaders that the Italian peninsula was "a natural aircraft carrier bestriding the Mediterranean;" an aircraft carrier was not necessary as Italy already possessed airfields all across the Mediterranean.



The launch of the dreadnought battleship *Francesco Caracciolo* on May 12, 1920, originally intended to have been armed with eight 381mm guns. Unfinished during World War I, *Francesco Caracciolo*'s three sisterships were scrapped after the conflict due to the collapse of the Italian economy but *Caracciolo* was considered for conversion into Italy's first flush-deck aircraft carrier. (Ryan Noppen Collection)

Seaplane carrier *Giuseppe Miraglia,* exiting the Mar Piccolo in Taranto harbor, in southern Italy. *Giuseppe Miraglia* was the Regia Marina's only aircraft vessel in service at the beginning of World War II. Note the Macchi M.18 seaplanes aboard the ship. (Wikimedia Commons)

Supporters of naval aviation within the leadership of Regia Marina did sponsor a number of drawing-board designs for aircraft carriers throughout the 1920s and 1930s but they were considered for construction only under reactionary circumstances, especially the threats of war with Great Britain and France during the Abyssinian War and the Spanish Civil War, by both Mussolini and the heads of the navy. The importance which these naval aviation advocates placed on the aircraft carrier is clearly evidenced by the number of carrier projects, listed in the table below, which were drafted and considered during the interwar years:



Interwar carrier project	Year	Details
9,000-ton carrier	1923	Flush-deck experimental aircraft carrier, inspired by the design of the United States Navy's USS Langley, with a 175m flight deck. Designed in 1920 and initially approved for purchase alongside the Trento-class heavy cruisers in 1923. Canceled in 1925 due to lack of funds.
12,000-ton hybrid cruiser carrier (Progetto Rota)	1925	Cruiser hull with an 86m flight deck amidships and a twin 203mm gun turret mounted both fore and aft. A floating dock at the stern was intended for MAS torpedo boats and recovery of seaplanes. Not supported by the Regia Marina.
3,500-ton catamaran carrier	1926	Designed by Alessandro Guidoni, a 100m-long vessel powered by two 2,000hp diesel engines and 96 800hp aircraft engines, with a projected maximum speed of 33kt. A stepped take-off deck fore with an upper landing deck above the 25-aircraft hangar. Not supported by the Regia Marina.
15,000-ton carrier (Progetto Bonfiglietti-Vian)	1932	Flush-deck carrier with a 215m flight deck, island and funnel starboard amidships, elevator amidships, and two-level hangar deck with capacity for 40 aircraft. A 20m slipway in the stern for MAS torpedo boats and recovery of seaplanes. Approved by Mussolini primarily as a means to maintain shipyard work. Considered for construction pending the results of the 1932–34 World Disarmament Conference in Geneva; canceled in 1934 due to the Regia Marina's new battleship construction.
14,000-ton carrier (Progetto Pugliese)	1936	Flush-deck carrier with a 196m flight deck, island and funnel starboard amidships, two-level hangar with a 42-aircraft capacity, and a maximum speed of 36kt. Inspired by the United States Navy's USS *Ranger*. Rejected by the Regia Marina in favor of potential ocean liner conversion projects. Plan developed due to British diplomatic hostility during the Abyssinian War.
25,000-ton carrier (Progetto Roma-Gagnotto)	1936	Conversion of the 32,583-ton ocean liner *Roma* into a flush-deck carrier. 162.5m upper landing deck above a hangar deck with a 60m take-off deck, mounting two pneumatic catapults, fore. Maximum speed of 26kt and capacity for 48 aircraft. Inspired by the British Royal Navy's HMS *Furious*. Plan developed due to British and French diplomatic hostility arising out of Italian involvement in the Spanish Civil War. Canceled by the Regia Marina in 1938 once the diplomatic crisis passed.

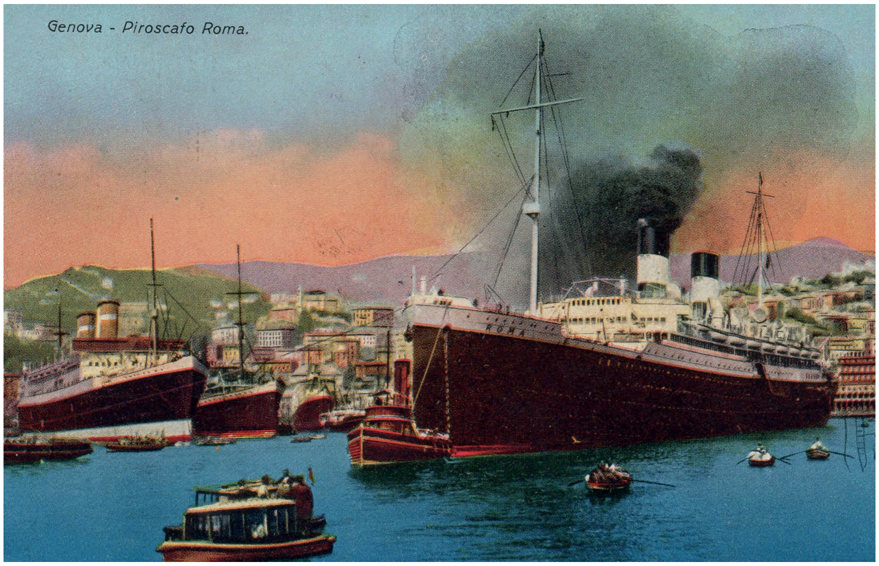
The only vessel devoted to air operations which the Regia Marina put into service during the interwar years was the seaplane carrier *Giuseppe Miraglia*. Originally laid down as the railway ferry *Città di Messina* in the Regio Arsenale della Spezia yard in March 1921, it was purchased by the Regia Marina in 1923 for conversion into a seaplane tender, filling the role that had been played by *Europa* which had been decommissioned in 1920. *Giuseppe Miraglia* represented Admiral Paolo Thaon di Revel's continued interest in naval aviation and, after the cancelation of the immediate postwar carrier projects due to lack of funds, was the most extensive aviation vessel he could secure for the Regia Marina during his tenure as *Ministro della Marine* from 1922 to 1925. When commissioned in November 1927, *Giuseppe Miraglia* could carry 17 seaplanes and, unlike *Europa*, mounted catapults fore and aft, allowing aircraft to be launched while the vessel was underway. *Giuseppe Miraglia* had a low maximum speed of 21kt, however, rendering it incapable of serving during fleet combat operations. Thus, like *Europa,* its primary role was that of a mobile seaplane base, with its air group used primarily for reconnaissance duties.

Admiral Arturo Riccardi (left), head of the Regia Marina from late 1940 until the Italian capitulation in September 1943, reviewing the crew of a Littorio-class battleship with Admiral Angelo Iachino (center) and Il Duce Benito Mussolini (right) in June 1942. Riccardi approved the Regia Marina's first flush-deck carrier, *Aquila*, shortly after becoming navy chief. (Wikimedia Commons)

***Giuseppe Miraglia* specifications**	
Dimensions	length: 121.2m; beam: 15m; draft: 5.8m
Full displacement	5,913 tons
Ship's complement	196 men plus air crews
Machinery	two Parsons geared turbines, fired by eight Yarrow boilers, producing 16,700shp and driving two screws at a maximum speed of 21kt

Aircraft	17 total aircraft (1927–31: Macchi M.18; 1931-37: CANT 25; 1937–43: IMAM Ro.43)
Catapults	two Gagnotto catapults, fore and aft
Hangars	two hangars housing five and six aircraft respectively and two workshops each housing three disassembled aircraft
Armament	four cannone da 102mm/35 Mod. 1914 antiaircraft guns; 12 Breda Modello 31 13.2mm machine guns
IMAM Ro.43 Specifications	
Dimensions	length: 9.7m / wingspan:11.6m
Powerplant	700hp Piaggio P.X R. radial engine
Maximum speed	300km/h
Range	800–1,500km
Ceiling	6,600m
Armament	two 7.7mm Breda-SAFAT machine guns, one fuselage-mounted forward-firing and one ring-mounted in the observer's cockpit
Crew	two

*Giuseppe Miraglia'*s limited capabilities played into the hands of the Regia Aeronautica's leadership and battleship-minded admirals of the Regia Marina, both claiming that a much more expensive proper aircraft carrier would not be able to perform many more duties than the seaplane carrier and hence reinforcing their argument that reconnaissance should be the sole mission of naval aviation. They also made the case that aircraft carriers and further seaplane tenders were redundant due to the installation of catapults and reconnaissance seaplanes aboard larger warships, beginning with the Trento-class heavy cruisers that were commissioned in 1928–29. *Giuseppe Miraglia* nevertheless served well in its intended role as a seaplane carrier and in the experimentation of different catapult-launched aircraft; its aircraft, as well as those embarked aboard the Regia Marina's heavy and light cruisers, were the extent of Italian shipboard aviation at the beginning of World War II.


Genova - Piroscafo Roma.

The aircraft carrier *Aquila* began its life as the Genoa-based *Navigazione Generale Italiana* line's 32,583-ton liner *Roma,* shown here in a period postcard. Built by the Ansaldo shipyards, it entered service in September 1926 and sailed on the Genoa–New York transatlantic route. (Ryan Noppen Collection)

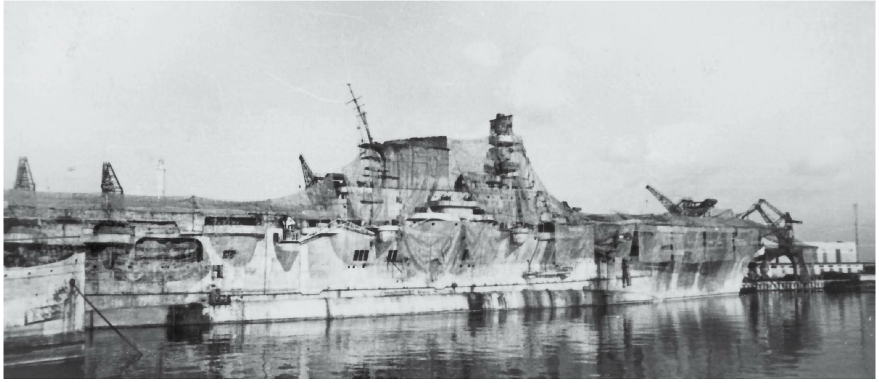
Aquila

When Italy entered the war against Great Britain and France on June 11, 1940, Admiral Cavagnari worried little about the potential threat posed by British and French aircraft to his warships. Mussolini had promised a brief war with the British, believing that a rapid show of force would compel them to seek terms by the autumn of 1940. Cavagnari's optimism was based solely on this promise, however, as the ability of the Regia Aeronautica to defend the skies over the Regia Marina's theaters of operation had been called into question in the months leading up to Italy's entry into the war. In a meeting with Mussolini and the army and navy chiefs of staff in September 1939, *Sottosegretario di Stato al Ministero dell'Aeronautica* Giuseppe Valle, Balbo's successor as head of the Regia Aeronautica, was forced to admit that the air force's capabilities had been inflated in recent years and that it was largely unprepared for war. Valle was sacked two months later and his replacement, *Generale di Squadra Aerea* Francesco Pricolo, was still remedying the problems left behind by Valle when Mussolini led Italy into the war. Pricolo, however, had been a protégé of Balbo and was an opponent of naval aviation; he paid only lip service to the Regia Aeronautica's antishipping capabilities in the months leading up to June.

The first months of Italy's involvement in the war went poorly for the Regia Marina, highlighting the Regia Aeronautica's inability both to counter the British Royal Navy at sea and to protect the Regia Marina from British air attack. At the Battle of Punta Stilo on July 8–9, 1940, 198 Regia Aeronautica bombers failed to inflict any serious damage against a force of 32 British warships, while a number of the bombers mistakenly attacked a countering Regia Marina force. At the Battle of Taranto on the evening of November 11–12, 1940, 20 Fairey Swordfish torpedo bombers, launched from the British carrier HMS *Illustrious*, attacked and sank the battleships *Littorio, Caio Duilio*, and *Conte di Cavour* in a surprise nighttime strike in Taranto harbor. The Regia Aeronautica failed to detect the approach and departure of the British task force as well as failing to provide a defense for the Regia Marina's base. The catastrophe at Taranto, compounded by other failures at sea since June, brought about Cavagnari's dismissal on December 7, 1940. Recognizing the Regia Aeronautica's failures at sea and the now proven capabilities of naval air power, clearly demonstrated by the British, *Ammiraglio di Squadra designato d'Armata* Arturo Riccardi, Cavagnari's replacement as *Sottosegretario di Stato al Ministero della Marina*, immediately called for the conversion of the ocean liner *Roma* (already considered for conversion in 1936) into a flush-deck aircraft carrier and a feasibility study into the conversion of the then-building battleship *Impero* into a carrier. Riccardi had a more favorable opinion than his predecessor and Mussolini was finally convinced of the importance of aircraft carriers, ordering *Roma*'s conversion on January 7, 1941. Mussolini further insisted upon Pricolo's and the Regia Aeronautica's cooperation in the establishment of an air group for *Roma* as well as the development of capable carrier-based aircraft. After a meeting of the military chiefs-of-staff on July 9, 1941, the parameters of the *Roma* carrier project were established and the liner was towed to the Ansaldo Officine Allestimento e Riparazioni Navi shipyard in Genoa for conversion.

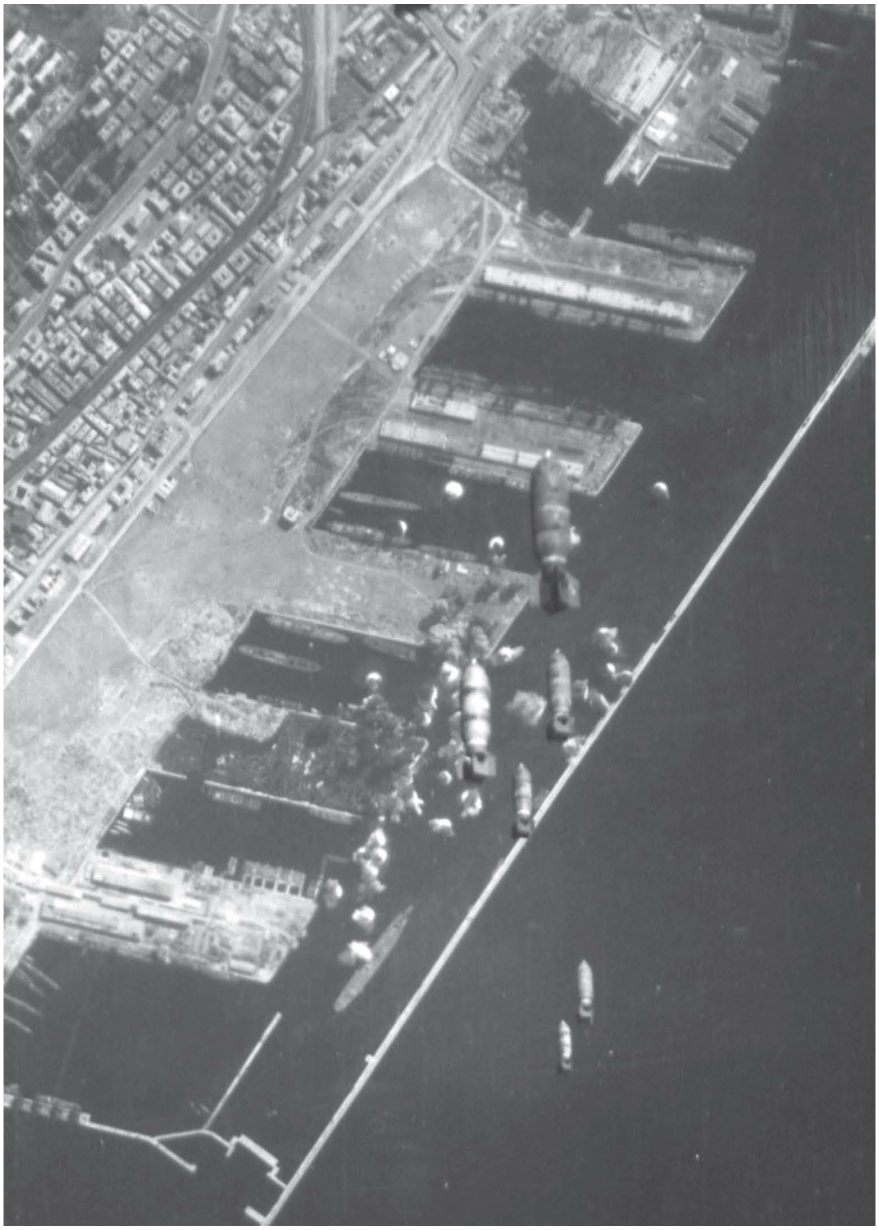
Renamed *Aquila* (Eagle), work immediately began on the demolition of *Roma*'s superstructure while its final conversion design was completed. As the Regia Marina intended *Aquila* to be a true fleet carrier, able to accompany fast battleships and cruisers on combat operations, the engineers overseeing its conversion intended to replace *Roma*'s original powerplant of eight coupled turbines, which generated 34,000hp for a maximum speed of 22kt. The powerplants of the two canceled Capitani Romani-class light cruisers *Cornelio Silla* and *Paolo Emilio*, two sets of two Belluzzo high-pressure/low-pressure paired turbines, were commandeered for this purpose. When installed to *Aquila*'s four shafts, they gave the vessel a much-improved maximum speed of 30kt, the same as the Littorio-class fast battleships. *Aquila*'s designers were equally creative with their protection scheme for the vessel's hull. The Regia Marina's favored Pugliese liquid-filled-cylinder underwater protection system could not be applied to *Aquila*'s pre-existing hull. Instead, bulges were added to the hull sides and partially filled with concrete, intended to help absorb the blast effects from a torpedo explosion and prevent splinter damage. In tests, this ersatz system proved to be surprisingly effective.

***Aquila* specifications**	
Dimensions	length: 231.4m; beam: 35.8m; draft: 7.4m
Full displacement	27,800 tons
Ship's complement	1,532 men
Machinery	four Belluzzo geared turbines, fired by eight boilers, producing 151,000shp and driving two screws at a maximum speed of 30kt
Aircraft	51 Reggiane Re.2001OR fighter-bombers
Catapults	two Deutsche Werke compressed air-driven catapults
Hangars	one hangar divided into four compartments
Range	10,186km at 18kt
Protection	60–80mm horizontal plate around aviation fuel tanks and magazines; concrete-filled bulges
Armament	eight OTO cannone 135mm/45 Modello 1938 dual-purpose guns in individual shielded mounts, four on each side amidships (135mm/45 gun had a range at 45º elevation of 19,600m and had an elevation range of -5º to 45º; six to seven shells could be fired per minute) 12 Ansaldo-Terni cannone 65mm/64 Modello 1939 antiaircraft guns in individual shielded mounts, six on each side (65mm/64 gun had a range at 45º elevation of 7,500m and had an elevation range of -10º to 80º; 20 shells could be fired per minute) 132 Breda 20mm/65 Modello 1935 antiaircraft guns in 22 six-barreled mounts, primarily concentrated on the island and amidships (20mm/65 gun had a range at 45º elevation of 5,500m and had an elevation range of -10º to 90º; 240 rounds could be fired per minute)



Aquila, under camouflage netting, along a wharf in the Ansaldo yards in Genoa following its removal from drydock in late autumn 1942. (Ryan Noppen Collection)

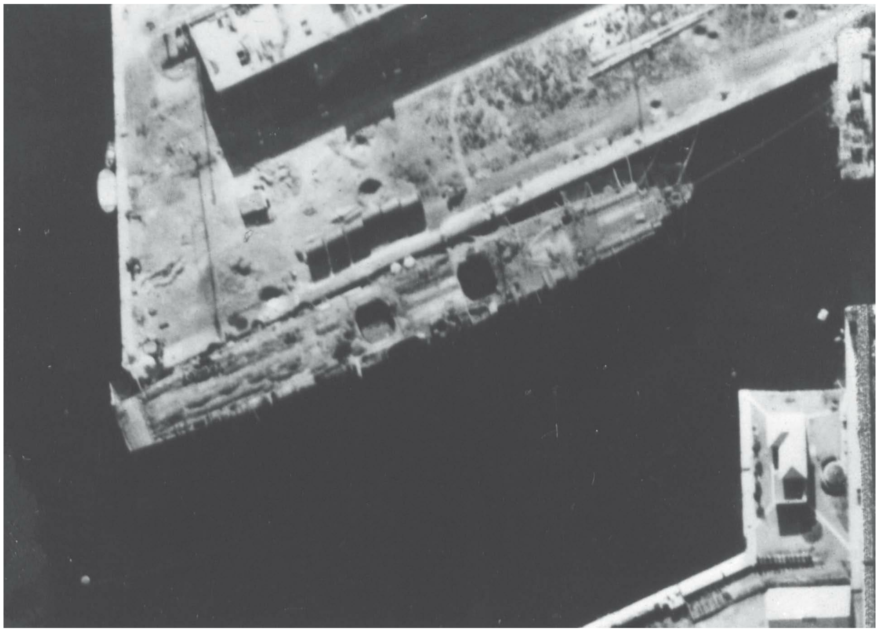
Above the machinery spaces, a 524.9ft (160m)-long single hangar was built into the upper section of the hull and was divided into four sections by fire doors. The 694.2ft (211.6m) partially armored flight deck was constructed above. A substantial island was mounted starboard amidships and contained a funnel, navigation bridge, pilot ready room, fire control station, and flight operations center. The island also housed the Regia Marina's new EC3/ter *Gufo* (owl) naval search radar equipment and 36 Breda 20mm/65 Mod. 1935 antiaircraft cannon in six six-mounts, three fore and three aft. The remaining antiaircraft armament consisted of an additional 96 20mm cannon, 12 65mm cannon, and eight 135mm cannon in sponsons or on platforms mounted around the hull, just below the flight deck. When considering *Aquila*'s aviation equipment, however, there was an immediate realization by the ship's designers that they had a steep learning curve ahead of them because the navy had only limited experience with aircraft catapults and no experience with arresting gear systems for landing wheeled aircraft on a flight deck, as the Regia Marina's previous carrier projects had never the left drawing board. These issues were surprisingly rectified in November 1941 when a commission of Regia Marina and Regia Aeronautica officers examined the German Kriegsmarine's aircraft carrier *Graf Zeppelin,* then sitting incomplete in the port of Gotenhafen. The Kriegsmarine shared all of its technical knowledge regarding carriers with the Italian commission and offered the catapults, elevators, and arrestor gear which had been manufactured for the *Graf Zeppelin*'s canceled sistership. With this generous German assistance, the Regia Marina suddenly had the specialized components which would have taken months of independent development.



Bombs targeting Genoa harbor on May 28, 1944 during a raid by B-24s of the 455th Bomb Group, 741st Bomb Squadron, 15th Air Force. *Aquila* is the large vessel along the wharf in the upper right of the photograph. (National Archives 204915200)

Obtaining capable aircraft for *Aquila* proved to be a much lengthier process than obtaining the carrier's specialized aviation equipment. Already at the meeting of the chiefs-of-staff on July 9, 1941, the Regia Marina requested a naval variant, with tailhook and folding wings, of the Regia Aeronautica's Reggiane Re.2000 *Falco* I fighter. A month earlier the Regia Marina had begun experiments in developing a catapult-launched variant of the Re.2000 for use aboard its battleships, a sign of how desperate the Regia

Marina had become for any degree of air cover. General Pricolo stated that the development and manufacture of a naval variant of the Re.2000 would require two years, and was unwilling to prioritize its development over other Regia Aeronautica priorities. Fortuitously for the Regia Marina, General Pricolo was replaced as Sottosegretario di Stato al Ministero dell'Aeronautica on November 15, 1941 by Generale di Squadra Aerea Rino Corso Fougier, an officer who saw the necessity of aircraft carriers as well as the need for air force–navy cooperation. Fougier founded a new study group, Organizzazione Roma (Roma Organization – referencing the carrier's previous name), to select suitable aircraft for *Aquila* and was willing to divert Regia Aeronautica aircraft orders towards the establishment of the carrier's air wing; *Aquila*'s aircraft and pilots were to remain under direct Regia Aeronautica control, however. Toward the end of 1941 it became apparent that the Re.2000 was inadequate for carrier use and both the Regia Marina and Organizzazione Roma, with General Fougier's blessing, selected the new Reggiane Re.2001 *Falco* II fighter for development into a carrier-based fighter-bomber. The Re.2001 possessed a more powerful and reliable engine, the 1,175hp Alfa-Romeo R.A.1000 R.C.41-I Monsone inline engine, compared to the Re.2000's unreliable 1,000hp Piaggio P.XI R.C.40 radial engine. The additional power allowed the Re.2001 to carry a potential payload of a 1,323lb (600kg) aerial torpedo (the Re.2001G variant) or a 1,389lb (630kg) antishipping bomb (Re.2001GV variant).



Aerial photograph of *Aquila*, taken on a United States Army Air Corps reconnaissance mission over Genoa. (National Archives 204915209)

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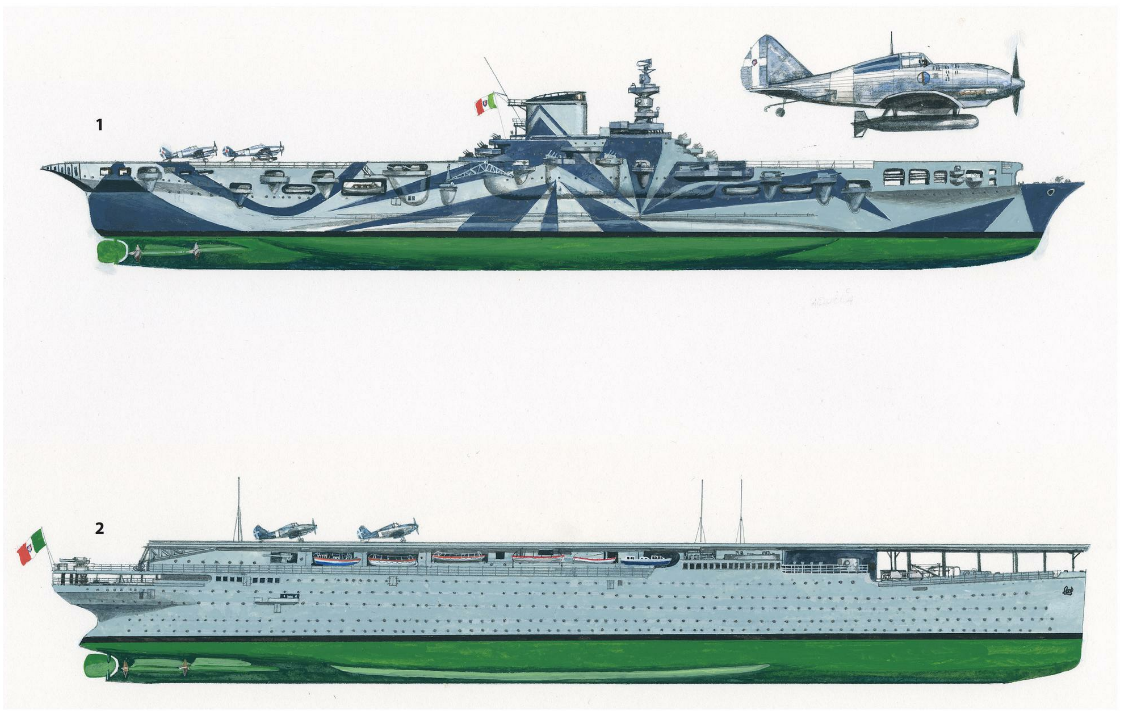


1. Aircraft carrier *Aquila*

The installation of the two Deutsche Werke catapults aboard *Aquila* required the use of the same collapsible launch carriage system, with all its limitations, as was to be used aboard the German aircraft carrier *Graf Zeppelin*. The launch process was time-consuming as each catapult could only launch one aircraft per minute and the high-pressure reservoir contained only enough compressed air to launch up to nine aircraft. Another problem was that a torpedo mounted to a Reggiane Re.2001OR blocked the attachment points for the catapult carriage, prohibiting the use of the catapults for aircraft carrying torpedoes. Torpedo-equipped Re.2001ORs would have had to use the full length of the flight deck to take off, prohibiting the congregating of multiple aircraft at the rear of the flight deck, further delaying the take-off time for an air group. The *Aquila* could carry a maximum of 51 Re.2001OR fighter-bombers stowed in the following manner: 26 stored in the hangar; 15 suspended from the hangar roof; and ten parked on the flight deck. *Aquila* is shown here in a hypothetical camouflage scheme, similar to ones applied to larger Regia Marina vessels in 1943. Also shown is a Reggiane Re.2001OR fighter-bomber equipped with a 600kg aerial torpedo.

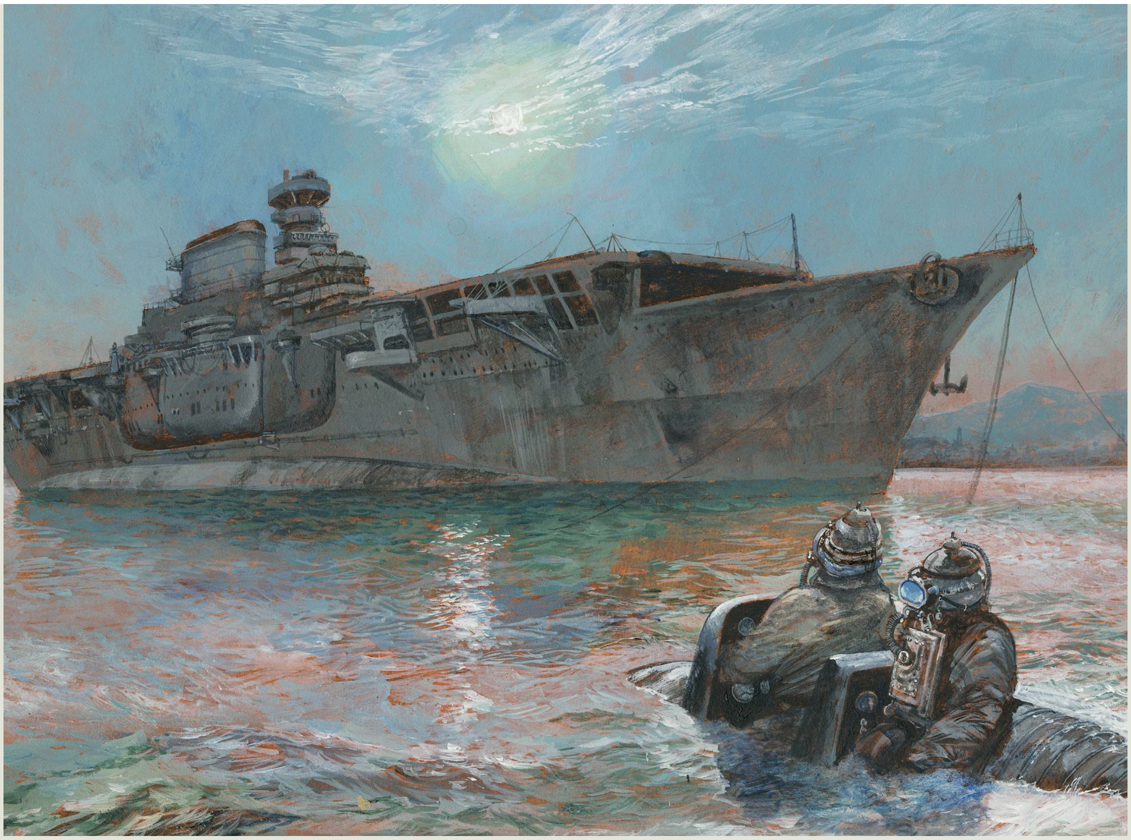
2. Escort carrier *Sparviero*

As *Sparviero*’s conversion design was being prepared, Regia Marina engineers hoped to add a small island and two German compressed air catapults to the vessel. The catapults would have allowed for the operation of torpedo- and bomb-equipped Re.2001OR fighter bombers, as intended aboard *Aquila*. 35 Re.2001ORs would have comprised *Sparviero*’s air wing under these circumstances. Without access to specialized German equipment after the Kriegsmarine resumed work on its own aircraft carriers and lacking time to develop its own equipment, the Regia Marina was forced to keep *Sparviero*’s conversion to a simplified version of the 1936 *Rom*a project, lacking the island, catapults, and arrestor gear. It is unlikely that the Re.2001OR could have taken off carrying a payload without the assistance of a catapult, limiting the aircraft’s role to only air defense. Given this and the Re.2001OR’s production delays, it was eventually concluded that another aircraft was needed. The IMAM Ro.63, a light-weight, high-wing reconnaissance aircraft similar to the German Fieseler Fi 156 *Storch,* was then considered due to its short-take-off and landing capabilities. With a maximum speed of only 203 km/h (126 mph), the Ro.63 was hardly considered as a combat aircraft but Regia Marina planners believed that the aircraft could be employed in an antisubmarine, or ASW, role. An order for Ro.63s for *Sparviero* was placed but the conversion project was canceled before any of the aircraft were manufactured. *Sparviero* is shown here according to its simplified conversion design.

Reggiane Re.2001OR specifications	
Dimensions	length: 8.4m wingspan: 11m
Powerplant	1,175hp Alfa-Romeo R.A.1000 R.C.41-I Monsone inline engine
Maximum speed	542km/h
Range	1,100km
Ceiling	11,000m
Armament	two 12.7mm Breda-SAFAT machine guns on the fuselage, two 7.7mm Breda-SAFAT machine guns in the wings
Payload	one 1390lb (630kg) antishipping bomb or one 1,323lb (600kg) aerial torpedo
Crew	one

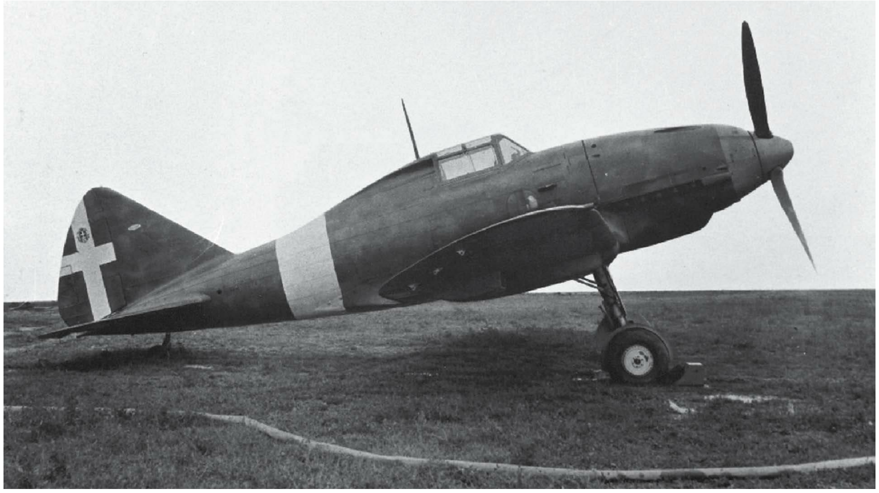
The Regia Aeronautica's first production order to include a navalized version – the Re.2001OR (for Organizzazione Roma) – was placed in the spring of 1941 and totaled 120 of the type, 50 of which were to be Re.2001ORs. A year later, in May 1942, this order was changed to 47 Re.2001 fighters and 39 Re.2001CB (*caccia-bombardiere* or fighter-bombers) capable of carrying up to a 550lb (250kg) bomb, as well as two "light-weight" Re.2001ORs for catapult trials. Twelve land-based versions were to be modified with arrestor hooks for carrier operations. The next order, placed in August 1942, reinstated the production of 50 Re.2001ORs. During the second half of 1942 and early 1943, two prototype Re.2001ORs were tested extensively at the Regia Aeronautica's airfield at Sant'Egidio near Perugia where a carrier flight deck mock-up had been constructed for training purposes. In the event only ten navalized versions of the Re.2001 were completed in early 1943 and the Regia Aeronautica redirected that the 50 Re.2001ORs be produced as Re.2001CN (*caccia-notturno*) night fighters.

G Operation *Toast*, April 18–19, 1945



As Allied planners made their final preparations for Operation *Grapeshot,* an offensive across northern Italy in April 1945, they realized that *Aquila*, moored derelict in Genoa, could be used by the Germans as a blockship to close the entrance between the old and new harbors in the port city. Number One Special Force of the British Special Operations Executive (SOE) was tasked with sinking *Aquila* before it could be used in this manner and Italian specialists from the Regia Marina's "Mariassalto" unit were recruited for the mission. The Mariassalto was made up of veterans of Decima Flottiglia MAS commando unit who had joined the Allied cause following the Italian armistice. At the outset of what was dubbed Operation *Toast* on the afternoon of April 18, 1945, the Regia Marina destroyer *Legionario*, leading a small assault force, left the Allied occupied port of Leghorn and proceeded towards Genoa. Later that night upon approaching the port, *Legionario* lowered two MTSM (*Motoscafo da Turismo Silurante Modificato*) motor torpedo boats into the water which in turn headed closer to Genoa. Aboard the MTSM boats were two British Chariot manned torpedoes, similar to the Italian *Maiali* (pig) human torpedoes successfully used by the Decima Flottiglia MAS throughout the war. A few miles off the harbor entrance, the Chariots disembarked. One encountered a breakdown a mile from the harbor entrance and had to abort but the second, operated by Sottotenente di Vascello Nicola Conte and Sottocapo Evelino Marcolini, entered the harbor and made its way to the Calata Canzio wharf where *Aquila* was moored. The warhead from the Chariot was left on the harbor bottom beneath the port side of the carrier and the divers were able to exit the harbor aboard the Chariot, being picked up by the waiting MTSM boat off the coast. The warhead detonated the following morning but only managed to rupture the portside cement-filled bulge;

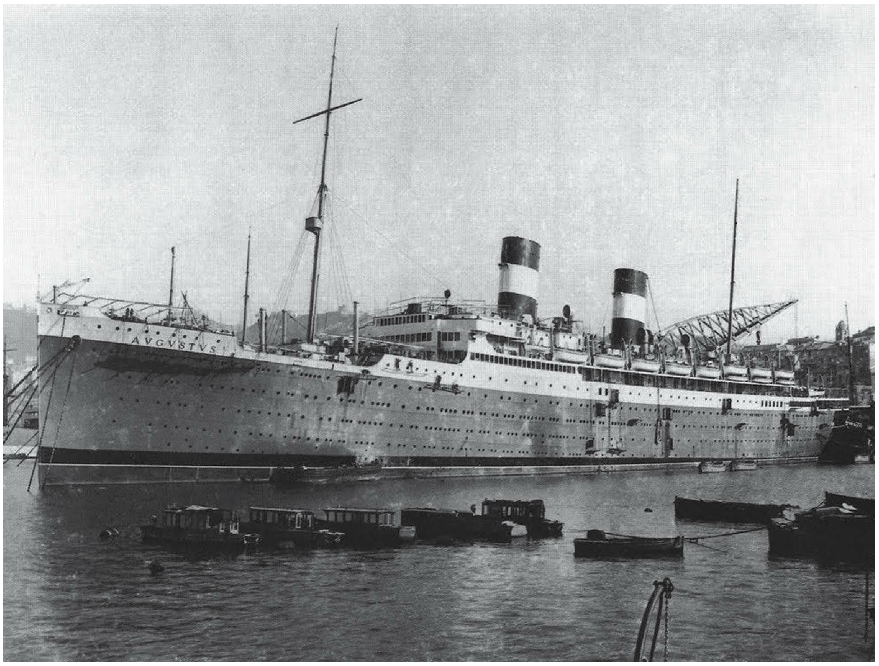
ironically this explosion demonstrated the integrity of *Aquila*’s ersatz torpedo protection system. Still afloat, the Germans moved *Aquila* to the narrow passage between the old and new harbors on the evening of April 23–24, 1945, intent on sinking it but sabotage by Italian dockyard workers foiled the German attempt to scuttle it. The Germans were forced to evacuate Genoa before another scuttling attempt could be made and *Aquila* fell into Allied hands on April 27, 1945.



Reggiane Re.2001 fighter. The Regia Aeronautica hoped to equip *Aquila*'s air wing with Junkers Ju 87 Stuka dive bombers but German aircraft exports to Italy were very limited. An Italian-manufactured aircraft was needed and the Regia Aeronautica decided to develop fighter-bomber and torpedo-carrying variants of the Re.2001. (Wikimedia Commons)

Despite the optimism from the new level of cooperation between the Regia Marina and Regia Aeronautica, wartime realities slowed the construction and fitting out of *Aquila*. Ansaldo originally promised a completion time of 12 months for *Aquila* but by October 1942 it was still in drydock awaiting the installation of its bulges and additional armor. The installation of the German flight deck equipment was also still underway. Material and labor shortages were the primary causes for the delay; after an inquiry by Admiral Riccardi, Ansaldo recalculated the final delivery time to be July 1943. Further delay was caused by five British Royal Air Force bombardments of Genoa, some specifically targeting the Ansaldo yards, between October 22 and November 16, 1942. *Aquila*'s flight deck received some light damage and it was taken out of drydock and towed to a dock in the yard. It was covered with camouflage netting to make it resemble a dock from the air while the nearby hull of the unfinished cruiser *Cornelio Silla* was covered with metal plates, making it appear as a carrier from the air; the ruse proved surprisingly effective. Toward the end of April 1943, *Aquila*'s machinery installation was finally completed and its turbines were given a stationary test while it remained moored alongside its dock. All work on the carrier was ordered halted on June 22, 1943, as all available labor and resources were reassigned to the construction of more-essential light vessels. The Italian armistice with Allied forces on September 8, 1943 sealed *Aquila*'s fate, however. After the

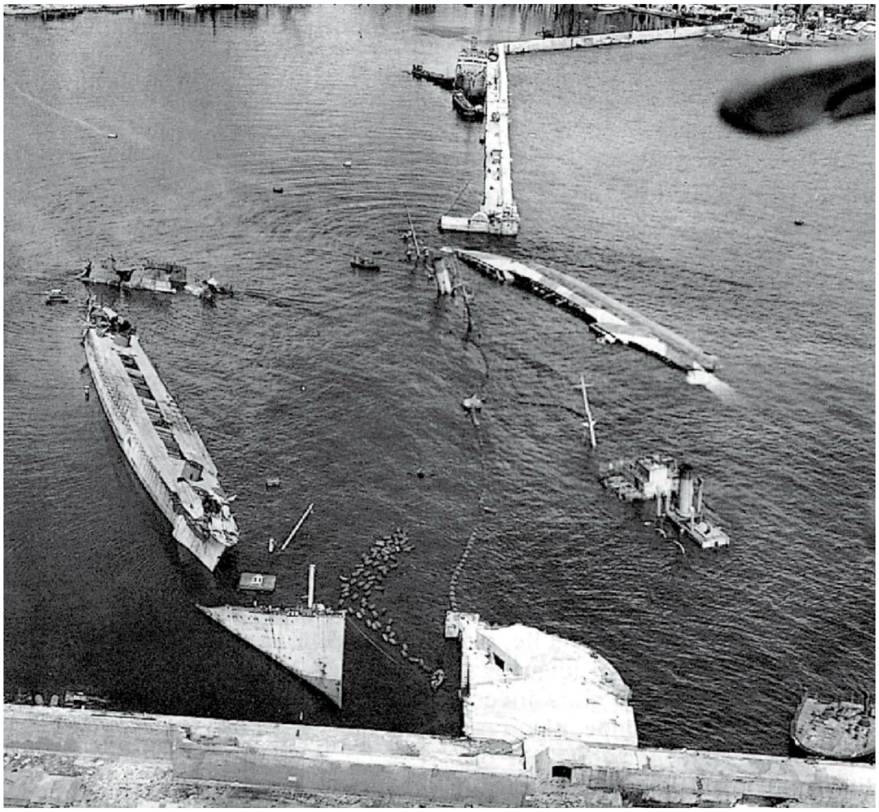
German occupation of Genoa, German engineering teams removed weapons, electrical equipment, and any other usable materials from the vessel. Its hulk remained in place until it was damaged in an air raid by Allied bombers in June 1944 and then moved to a disused pier along the Calata Canzio wharf. The Germans attempted to use *Aquila* as a blockship when they evacuated Genoa on April 24, 1945, but it failed to sink. *Aquila*'s hulk remained in Genoa until 1949 when it was towed to La Spezia and later scrapped there in 1952.



The *Navigazione Generale Italiana* line's 32,650-ton liner *Augustus*, requisitioned in July 1942 for conversion into the escort carrier *Sparviero*. Built by Ansaldo and first sailing in November 1927, *Augustus* differed from its near-sister *Roma* in that it was powered by four Savoja-MAN diesel engines. (Ryan Noppen Collection)

Sparviero

Aquila was not the Regia Marina's only attempt to put an aircraft carrier into service during the war. On July 1, 1942, *Roma*'s near-sister, the liner MS *Augustus*, was also commandeered for conversion into a carrier. By the second half of 1942, the Regia Marina was desperate to protect supply convoys to North Africa and it was decided to reconstruct *Augustus* into an escort carrier, rechristened *Sparviero.* The Regia Marina's designers turned to a set of preliminary plans which had been drafted in 1936 for a relatively simple conversion of the liner *Roma* (not to be confused with a more extensive conversion noted previously in the text) for the sake of expediency. The plans called for the removal of the liner's superstructure, to be replaced with a hangar deck and a 155m x 25m (508.5ft x 82ft) flight deck above. Pultruding fore from the flight deck was an additional 50m x 5m (164ft x 16.4ft) extension, intended to house a single pneumatic catapult; this feature was removed in *Sparviero*'s conversion design, with the main flight deck lengthened to a total of 180m (590.5ft). Unlike *Aquila, Sparviero* retained its original powerplant in order to expedite its conversion. Its four Savoja-MAN diesel engines produced a maximum speed of only 18kt but that was considered sufficient for convoy escort duties. Like its near-sister, however, it would receive a similar concrete-filled bulge protection scheme. *Sparviero*'s conversion design resembled similar wartime Imperial Japanese Navy merchant-escort carrier conversions as it had no island and its bridge was housed beneath the flight deck fore. Beginning in October 1942, work began on the removal of the superstructure of the vessel, which was completed by the end of the year. During that time engineers made a revised conversion plan which would give *Sparviero* a small island to starboard and two German compressed air catapults. This plan was quickly dropped, however, when the Kriegsmarine was unable to provide catapults and arresting gear due to the sudden resumption of its own aircraft carrier program. No further work on *Sparviero* took place before April 1943 when the project was suspended; due to the collapse of the North African front that spring, there was no longer an immediate need for an escort carrier. *Sparviero*'s hulk sat abandoned until October 5, 1944, when the Germans sank it as a blockship in the eastern entrance to Genoa's harbor. Its wreck was removed and scrapped in 1947.

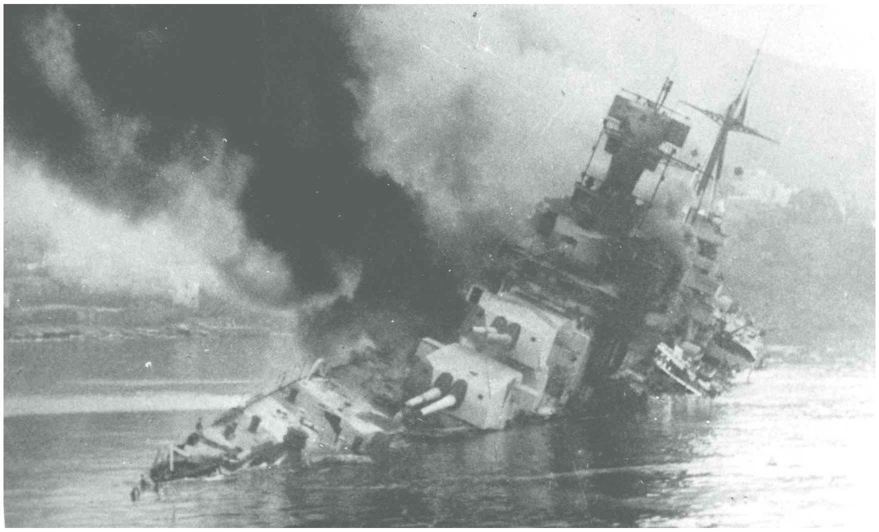


The Eastern inlet, between the Molo Cagni and the Molo duca di Galliera, leading into Genoa harbor, photographed at the end of World War II. The Germans sank several ships to block the inlet including *Sparviero*, whose bow is protruding from the water along the mole at the bottom left of the photograph. (Ryan Noppen Collection)

***Sparviero* specifications**	
Dimensions	length: 216.7m; beam: 34m; draft: 9.2m
Full displacement	28,000 tons
Ship's complement	1,420 men
Machinery	four Savoja MAN diesel engines, producing 28,000shp and driving four screws at a maximum speed of 18kt
Aircraft	35 Reggiane Re.2001OR fighter-bombers or 35 IMAM Ro.63 ASW aircraft
Hangars	one
Protection	60–80mm horizontal plate around aviation fuel tanks and magazines; concrete-filled bulges
Armament	eight OTO cannone 135mm/45 Modello 1938 dual-purpose guns in individual shielded mounts 12 Ansaldo-Terni cannone 65mm/64 Modello 1939 antiaircraft guns in individual shielded mounts 24 Breda 20mm/65 Modello 1935 antiaircraft guns in four six-barreled mounts

Bolzano

The final aircraft carrier conversion project considered by the Regia Marina during World War II showed just how desperate the navy's need for air cover for its convoys had become, and the desperate extent to which the navy was willing to go to acquire it. On August 13, 1942, the heavy cruiser *Bolzano* was torpedoed by the British submarine HMS *Unbroken* and the stricken vessel was beached off the island of Panarea, north of Sicily. After being patched up and towed to La Spezia for repairs in October 1942, a design study was initiated for the conversion of *Bolzano* into a *nave lanciaerei,* or aircraft launch vessel. The resulting conversion design called for the removal of *Bolzano*'s superstructure and armament fore of the aft funnel, to be replaced with a "flight deck" with a track running down the center of it. Carriages, mounting the vessel's aircraft, were aligned on the track which ended at two diagonally placed catapults installed on the ship's bow. It was intended that 12 Re.2001ORs be embarked, ten lined up along the flight deck track and one on each catapult. *Bolzano*'s intended role would have been similar to that of the British Catapult Aircraft Merchant (CAM) ships, used by the Royal Navy before escort carriers were available in adequate numbers: to provide emergency air cover for convoys, as the fighters launched would have to find a land base or ditch after being launched. In addition to the above-waterline changes, two of the cruisers' ten boilers were to be removed, decreasing the vessel's maximum horsepower from 150,000hp to 120,000hp but creating 3,500 cubic meters of cargo space; such was the desperate need for supplies to get to North Africa at the time. This desperate conversion plan never went beyond a preliminary stage, however, as its damage from *Unbroken'*s torpedo had not even been repaired by the time of the Axis surrender in North Africa in May 1943 due to labor and material shortages. As with *Sparviero,* work on *Bolzano* was abandoned as there was no further need for escort operations. On the night of June 21–22, 1944, a team of British and Italian commandos sank *Bolzano* in La Spezia harbor using a British Chariot manned torpedo.



Heavy cruiser *Bolzano*, beached off the island of Panarea, north of Sicily, after being torpedoed by the British submarine HMS *Unbroken* on August 13, 1942. The proposal to radically modify *Bolzano* into an aircraft launch vessel/fast cargo vessel showed just how desperate the Regia Marina was for aircraft at this stage of the war. (Ryan Noppen Collection)

CONCLUSION

On the surface, the tangible development of Italian aircraft carriers during World War II can be easily summed up as a case of too little, too late. The efforts of those who supported the development of aircraft carriers and who proposed multiple projects throughout the interwar years were defeated by a combination of lack of financial resources, the largely battleship-minded leadership of the Regia Marina, and the unwillingness of the Regia Aeronautica to support the development of naval aviation. The Marina Militare, the successor organization to the Regia Marina, finally commissioned Italy's first aircraft carrier, *Giuseppe Garibaldi,* in 1985, 40 years after the end of World War II.

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ABOUT THE AUTHORS

Douglas C. Dildy is a retired US Air Force colonel with approximately 3,200 hours of fast jet time. He is a USAF Academy graduate with a Masters degree in Political Science and has authored numerous books, including *To Defeat the Few* for Osprey. He contributes regularly to the modelling magazine *Small Air Forces Observer* and lives in Albuquerque, New Mexico.

Ryan K. Noppen is a military author and consultant originally from Kalamazoo, Michigan and holds a Master of Arts degree in European History from Purdue University. A scholar of Dutch, German, and Central European military history, he has published a major history of Dutch air power and has written several titles for Osprey. He lives in California, USA.

ILLUSTRATOR

Paul Wright has painted ships of all kinds for most of his career, specializing in steel and steam warships from the late 19th century to the present day. Paul’s art has illustrated the works of Patrick O’Brian, Dudley Pope and C.S. Forester amongst others, and hangs in many corporate and private collections all over the world. A Member of the Royal Society of Marine Artists, Paul lives and works in Surrey.

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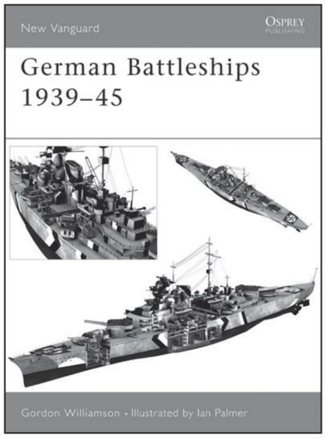
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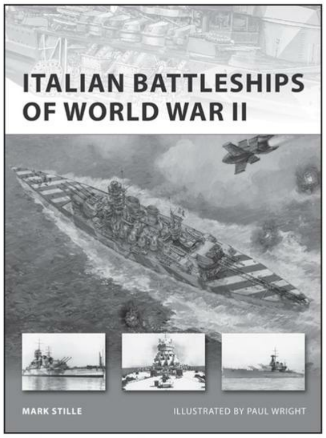
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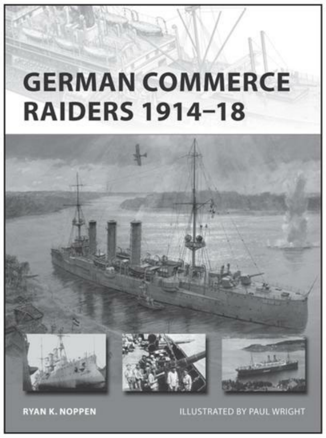
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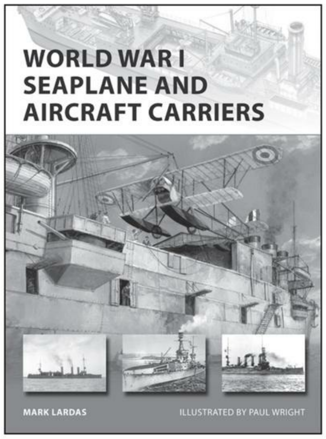
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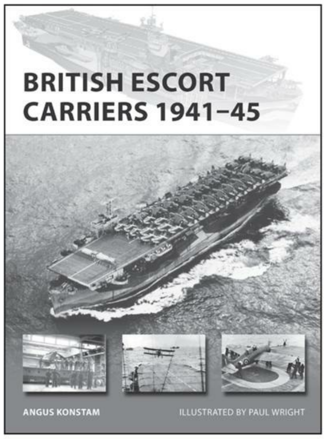
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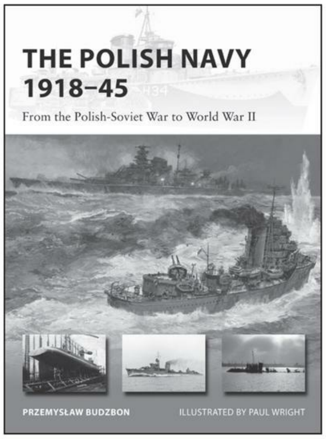
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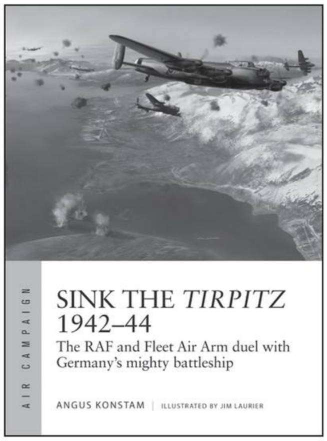
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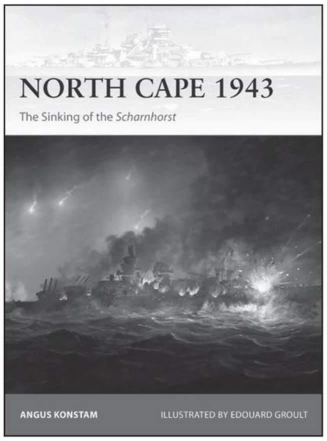
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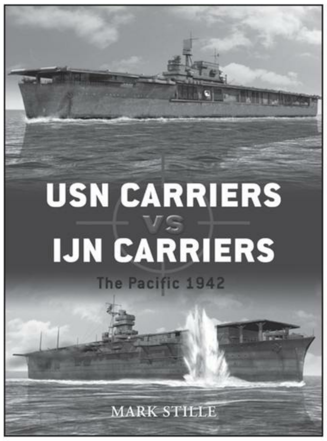
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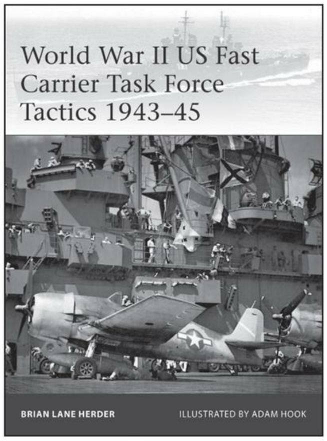
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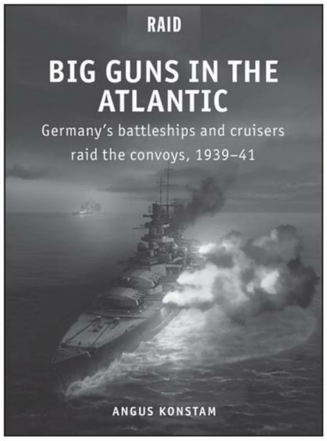
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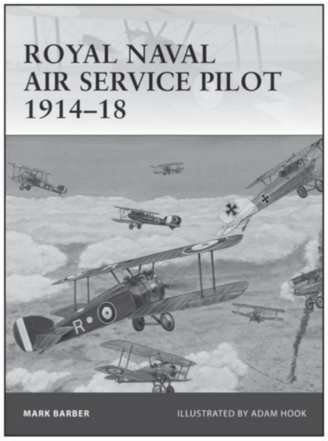
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